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**IT RARELY OCCURS: MOCK JUROR REACTIONS TO
A PHYSICIAN'S DEFENSE IN A LACK OF INFORMED CONSENT CASE**

A Dissertation

**Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy**

in

The Department of Psychology

by

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Abstract

Three experiments examine how expressions of probability concerning why a risk involved in a medical procedure was not disclosed influence mock juror decisions (e.g., liability, culpability, and damage awards). Across all three experiments, no differences were found in mock juror judgments of liability due to the probability expression used, be it verbal, quantitative, percentage, or frequency. Furthermore, differences in mean damage awards were only found when psychological uncertainty was manipulated using a frequency expression. However, an examination of the median damage awards suggests that some expressions of probability are likely to result in higher damage awards than others. Thus, while the type of probability expression used does not appear to influence whether or not a physician-defendant is found liable, it may have an impact on the size of the damage award. A fourth experiment examines how expressions of probability concerning a non-disclosed risk influence decisions of whether or not a patient should undergo treatment. The results of this experiment indicate that hindsight (i.e., knowledge of the complication occurring during surgery) may have played a role in the results of Experiments 1-3. Implications and recommendations for physicians and lawyers are discussed.

Introduction/Informed Consent

What constitutes a truly informed patient? The legal answer is one who has received all relevant information necessary for him/her to make a reasonable decision (Faden & Beauchamp, 1986; Jasper, 1996; Lidz et al., 1983; F. Rozovsky, 1990). In medical situations, this would include an explanation of what the treatment would involve, the benefits and risks associated with the treatment, and available alternatives (including non-treatment). While this appears to answer the question, the devil is in the details, or in this case, the lack of details. For example how are “relevant” and “all” determined? Are the same things relevant to all patients, or does disclosure need to be tailored to each individual? Is a risk relevant based on the frequency of occurrence, the severity of the risk involved, some combination of the two, or something else entirely? Is merely mentioning a risk enough or does it require further explanation, and if so, how much and in what manner? With few exceptions the law does not define the amount and type of information necessary for informed consent (e.g., La. R.S. 40:1299.40 E).

This ambiguity in the informed consent laws has been a source of frustration for physicians, and has led to perceptions that the laws are just legal ploys allowing disgruntled patients to recover damages in situations involving a bad outcome that is not the result of negligence (Curran, 1970; DeLee, 1976; Slovenko, 1997). Physicians have also viewed informing the patient as an impediment to successfully performing their job not only because informing the patient is time consuming for both the patient and the physician, but because it is cruel, punitive, and inexcusable to mention all the possible negative outcomes to a patient already suffering from the fear of undergoing procedures

such as surgery (DeLee, 1976). Some also feel that consent forms would necessarily frighten many patients away from treatments that would be beneficial to them (DeLee, 1976). While the resistance to informed consent is no longer as strong as it once was,¹ physicians are still concerned about the lack of explicit guidelines constituting what “informed” means (Daniels & Andrews, 1989).

The current experiments are designed to explore what factors influence jurors’ determination of liability in informed consent cases. This will not only provide physicians with some suggestions for protecting themselves against lawsuits, but may also improve physician-patient communication resulting in improved care. Before describing the current experiments, I will provide a brief overview of informed consent law.

While many people consider informed consent to be just a form they sign in order to receive treatment, health care providers who treat it as such may face malpractice claims. A number of commentators from different professions have written about the proliferation of malpractice claims based on a lack of informed consent (Curran, 1970; Eisner, 1985; Hirsh and Wilcox, 1992; Slovenko, 1997). William Curran (1970) of Harvard Medical School claims that failure to obtain informed consent is one of the two

¹Findings that patient satisfaction and good physician-patient communication, both of which presumably result from better informed consent, lead to fewer malpractice claims have softened the blow of the extra work required to obtain an informed consent (Dobson, 1989; Levinson 1994; Levinson, Roter, Mullooly, Dull, & Frankel, 1997; Mark & Spiro, 1990; L. Rozovsky, 1990).

favorite plaintiff doctrines of courtroom attack (the other being *res ipsa loquitur*).²

Hirsh and Wilcox (1992), both lawyers, claim that over the past 20 years the failure to disclose medical risks has become a major and steadily increasing source of recovering damages in malpractice cases. They claim that when malpractice lawyers are unable to prove negligent medical treatment, their fallback position is that the health care provider neglected to obtain the patient's informed consent and that the plaintiff's injuries resulted from risks that the patient would not have been willing to accept had the information been disclosed to him. Likewise, Slovenko (1997) described informed consent as a ploy developed "to provide another course of action in cases of poor outcome when negligence in treatment could not be established" (p. 652).

The data concerning the frequency of malpractice claims neither clearly support nor contradict physicians' concern that the changes in informed consent laws would increase either the number of malpractice claims made, or the number of lawsuits resulting in a verdict for the plaintiff. The National Association of Insurance Commissioners found that the issue of informed consent was raised as an issue in only 3% of the malpractice cases resolved between 1975 and 1976 (Law & Polan, 1978). Likewise, the Commission on Medical Malpractice (1973), created by the Secretary of the then Department of Health, Education, and Welfare, determined that informed consent was the most significant issue in only 2.4% of all appellate malpractice decisions nationwide through 1971. Robertson (1991) determined that there had been little impact

²Translated, this means the situation speaks for itself. This refers to a common sense inference that something occurred that would only occur if someone else was careless (e.g., physician amputates the wrong foot).

on the frequency or severity of malpractice claims in the ten years after the Supreme Court of Canada introduced major changes in the law of informed consent.

On the other hand, Annas (1976) indicates that while very few claims are filed solely on the grounds of a lack of informed consent (and fewer still have resulted in a verdict for the plaintiff) an increasing number of lawsuits filed against physicians include the allegation of a lack of informed consent. Danzon (1986) showed that, in 1976, jurisdictions that had adopted informed consent laws by 1970 had claims costs nearly double that of states which had not yet adopted informed consent laws. Similarly, a report, published by the American Hospital Association (Ludlam, 1978), stated that in the mid-1970s an allegation of failure to obtain informed consent was made in 14% of all malpractice cases filed.

While the evidence is somewhat conflicting concerning the frequency of claims of a lack of informed consent, the arguments espoused above (e.g., Curran, 1970; Hirsh & Wilcox, 1992; Slovenko, 1997) are indicative of the perception of a medical malpractice crisis (e.g., increased filings and outrageous damage awards) brought about in part by an overly permissive legal system (Daniels & Andrews, 1989; Eisner, 1985). This is important in that if health care providers are overly concerned about facing a malpractice claim, it could affect the quality of their care. That is, their focus may be on what they can do to protect themselves instead of on what is in the best interest of the patient. For example, physicians may refuse to treat non-emergent cases that are either difficult or are just as likely to get worse as they are to get better for fear that they will be sued if the patient does not recover. Furthermore, they may fail to mention new, innovative

treatments for fear of the patient choosing that treatment, then suing after a bad outcome because the risks of new treatment were not fully explained. Even if the data do not support these beliefs, they still have the potential to influence health care provider behavior.

Legal Requirements of Informed Consent

In 1957, the case of Salgo v. Leland Stanford Jr., University Board of Trustees changed the physician-patient relationship from one of physician beneficence to one of patient autonomy. In this case, the patient had consented to an aortography which resulted in paralysis from the waist down. However, the patient had not known that paralysis was a risk involved in this procedure. Drawing on previous cases that had established a right against unauthorized touching in relation to medical procedures (i.e., Mohr v. Williams, 1905; Schloendorff v. The Society of New York Hospitals, 1914), the court held that it was not enough for a surgeon to obtain consent to a procedure, but that it had to be an informed consent. To obtain informed consent, the physician must disclose all facts relevant to a patient's rights and interests, as well as the risks, hazards, and dangers involved (Faden & Beauchamp, 1986; Jasper, 1996; Lidz et al., 1983; F. Rozovsky, 1990), enabling the patient to make the final decision of whether or not to undergo the procedure. This decision must be made voluntarily with no coercion, duress, or undue influence by the health care provider³ (Faden & Beauchamp, 1986;

³An attempt has been made in this paper to use "health care provider," instead of physician or doctor, as an indication that these laws apply to a wide range of care givers in addition to physicians (e.g., nurses, therapists, etc.). However, the term physician is occasionally used for ease of reading or if a study specifically refers to only physicians.

Jasper, 1996; Lidz et al., 1983; F. Rozovsky, 1990). This case clearly changed the role of the patient from one of passive recipient to active consumer of medical care.

Informed consent is necessary for all types of treatment and investigative procedures, whether they are routine or highly invasive (Faden & Beauchamp, 1986; F. Rozovsky, 1990). It is not merely the signing of a form giving permission to proceed, but a process in which both the patient and health care provider exchange information allowing the patient to reach an informed decision concerning whether or not to undergo the proposed treatment (Faden & Beauchamp, 1986; F. Rozovsky, 1990). Indeed, signed forms are not even legally necessary, although they are helpful for documentation purposes. For this process to be effective, both the patient and the health care provider must be active participants. Obviously, the patient requires active input from the health care provider in order to obtain the details necessary to reach a decision regarding the treatment (i.e., risks, benefits, and alternatives). The patient must also actively provide information (i.e., accurate medical history) so the health care provider is aware of any complicating conditions (e.g., drug sensitivities) that may affect the treatment choice. The patient is also responsible for informing the health care provider about any particularly strong feelings toward potential side effects or outcomes (e.g., if a woman wants to have children a hysterectomy as a preventative measure may not be acceptable) so he can tailor the disclosure to the particular patient.

Criteria for a Valid Consent

To determine whether the consent given is legally valid, a number of basic criteria must be met (Flowers, 1987; Forrest, Perez, & Kawamura, 1986; F. Rozovsky, 1990).

First, the consent must have been given voluntarily. Health care providers are permitted to urge patients to follow a given recommendation; however, they are not allowed to coerce or obtain the consent from a patient under duress. Second, the patient must be both legally and mentally competent to give authorization (Dymek, Marson, & Harrell, 1999). A person is presumed to be mentally competent to give consent unless a judicial order or an applicable piece of legislation states otherwise. Third, the patient must possess sufficient information in order to reach a decision (Chalmers & Swartz, 1993; Flowers, 1987; F. Rozovsky, 1990).

Although the amount of information required can vary among jurisdictions (see section on Louisiana below), all jurisdictions require that the patient be provided with at least: (1) the likely outcome of diagnostic tests; (2) the likely benefits of diagnostic tests in determining a patient's illness or the extent of his or her injury; (3) the probable outcome of medical and/or surgical interventions; (4) the likely benefits from medical and/or surgical procedures; (5) an explanation of what a diagnostic, medical or surgical procedure will involve, including any probable complications, and any temporary discomfort, disability, or disfigurement; (6) an explanation of any permanent results of a medical or surgical procedure; (7) a disclosure of risks that are reasonably foreseeable at the time that consent is obtained; (8) the disclosure of remote risks that are probable for particular patients (e.g., patients with long-standing histories of severe allergic reactions to foods and medicines should be informed of the risk of an allergic reaction to contrast dye used in diagnostic tests; those without such histories need not be informed); and (9)

the availability of reasonable alternative procedures (Chalmers & Swartz, 1993; Flowers, 1987; F. Rozovsky, 1990).

The fourth criterion requires the disclosure of information to be at a level that is understandable to the patient (Faden & Beauchamp, 1986; Flowers, 1987; Forrest et al., 1986; F. Rozovsky, 1990). Presenting the information at too high a level may cause patients to become too embarrassed or intimidated to admit not understanding something. Alternatively, presenting the information at too low a level may insult patients to the point that they do not ask pertinent questions. Either way can lead to the patient's failure to obtain and/or understand enough information to make an informed decision.

The final criterion of informed consent concerns how the health care provider responds to a patient's questions. First, the patient must have the opportunity to ask questions. Second, any question that is asked should be answered in as straightforward a manner as possible, taking the needs and health of the patient into account. This allows health care providers to withhold certain information if, in their medical judgment, its disclosure might endanger a patient's health. However, this is permitted only in limited situations and if challenged, the health care provider must prove the decision was reasonable in the circumstances. The withholding of information is not permitted just because the disclosure may result in the patient refusing treatment, nor can the notion that "Doctor knows best" be the basis of the decision (F. Rozovsky, 1990).

Who Must Obtain the Informed Consent? The duty to disclose the relevant information to the patient falls on the health care provider who will perform the

diagnostic test, medical treatment, or surgery. This is based on the premise that the health care provider performing the procedure has the most information and is best able to handle any questions posed by the patient. Liability for failure to obtain an informed consent is limited to the actual health care provider performing the procedure. That is, hospitals cannot be held responsible for a lack of informed consent for a procedure performed on their premises, unless it can be shown that the hospital knew, or should have known, that a health care provider had not obtained a patient's consent (Faden & Beauchamp, 1986; F. Rozovsky, 1990).

Legal Standards. There are two basic legal standards against which to judge liability: (1) the medical community (or standard practice) standard; and (2) the patient need (or reasonable person) standard. Initially, all informed consent cases fell under the medical community standard (Dailey, 1994; Dobson, 1989; McMahon, 1986; Minter, 1984; Olcott, 1989), which is the same standard used in medical negligence cases. Today, more and more jurisdictions are changing to the patient need standard (Dailey, 1994; Olcott, 1989).

Under the medical community standard, the health care provider is only required to disclose information that would be disclosed by other health care providers in the same community (Dailey, 1994; Dobson, 1989; Olcott, 1989; F. Rozovsky, 1990). In trying cases under this standard, expert testimony (i.e., of other health care providers) is required to establish what the common practice is. There are some problems with using this standard. First, what needs to be disclosed is defined by the very people whom the lawsuits would be brought against. Thus, the medical community may decide that

disclosure of any number of risks is not necessary, thereby making it impossible for health care providers to be found liable for malpractice even if disclosure would have caused the patient to refuse treatment.

Another problem is that the medical community standard is not defined exactly the same in all jurisdictions. One definition is agreement by “a considerable number” (Dailey, 1994, p. 713) of health care providers regarding the correct course of treatment. Thus, health care providers may hesitate to use innovative medical treatments that have not yet obtained this level of acceptance for fear of the patient choosing said alternative and then having the basis for a liability claim (Dailey, 1994). This situation not only deprives patients of control over their treatment, as intended by informed consent statutes, but it actually provides a disincentive for health care providers to try innovative or new treatments, thereby slowing the advance of medical care.

Under the patient need standard, first established in Canterbury v. Spence (1972), the requirement for informed consent is what a reasonable person in the patient’s position would have done. Here, the amount of information that is required to make an informed decision is based on what the patient needs to know, not on what the health care provider deems appropriate. In cases using this standard, plaintiffs are allowed to state that if they had been informed, prior to undergoing treatment, of the risk of the negative outcome that occurred, they would not have agreed to it. Hindsight can definitely play a role here, in that the negative outcome has already occurred and it is difficult to determine what patients actually would have chosen to do had they been fully informed. No expert testimony is required under this standard.

Critics of the reasonable person standard claim that it is not in the best interest of either the patient or the health care provider and is impossible to satisfy. For example, one claim is that only physicians have the ability to estimate effectively the psychological and physical ramifications that disclosure might produce in a patient. Another claim is that the reasonable person standard is too burdensome, causing physicians to waste time in reviewing every possible risk with the patient, thereby interfering with the physician's discretion to determine what form of treatment is appropriate for the patient (Olcott, 1989). Finally, once the plaintiff states that he/she should have been informed about something, the burden is shifted to the health care provider to prove why that information was not disclosed. However, under the medical community standard, the response to why a patient was not informed may simply be "no one else does either," which is equally undesirable.

Informed Consent in Louisiana

Louisiana has one of the most detailed informed consent laws. In 1975, Louisiana attempted to resolve the ambiguity inherent in the informed consent laws by passing the Louisiana Uniform Consent Law (La. R.S. 40:1299.40). This law states that, unless it is proven that the consent was obtained by a misrepresentation of material facts, it will be presumed to be valid as long as the following conditions were met:

1. The physician told the patient the nature and purpose of the procedure together with the risks, if any, of death, brain damage, quadriplegia, paraplegia, the loss of function of an organ or limb, and of disfiguring scars associated with such procedures.

2. The physician acknowledges that such disclosure of information has been made and that all questions asked about the procedure have been answered in a satisfactory manner.
3. The consent is signed by the patient.

Not only did this law make it very difficult to establish the claim of a lack of informed consent, the risks included in the first condition were considered to be all the relevant risks that had to be disclosed regardless of the procedure. This law was upheld until 1989 when the Louisiana Supreme Court ruled in Hondroulis v. Schumaker (1989) that “loss of function of an organ” was too vague, and that health care providers needed to disclose material risks (i.e., those that a reasonable person would need to know in order to decide whether or not to undergo the proposed treatment).⁴ As a result, physicians began to list as many risks as possible (in some cases over 100) because they were not sure what a court would determine to be material in hindsight (Palmisano, 1995).

Then, in 1990 Louisiana created the Medical Disclosure Panel (R.S. 40:1299.40 E). This panel was created “within the Department of Health and Hospitals to determine which risks and hazards related to medical care and surgical procedures must be disclosed by a physician or other health care provider to a patient or persons authorized to consent for a patient and to establish the general form and substance of such disclosure” (pg. 2, La R.S. 40:1299.40 E). The panel consists of six physicians, three attorneys from the Louisiana Trial Lawyers’ Association, one attorney from the

⁴Note that this helped to solidify Louisiana’s adoption of the reasonable person standard.

Louisiana Defense Counsel Association, and one dentist who specializes in oral and maxillofacial surgery. This amendment to R.S. 40:1299.40 listed the following five requirements that must be met by the health care provider in order to be covered by the provisions of the statute:

1. Disclosure of the risks and hazards in the form and to the degree required by the panel.
2. Disclosure of additional risks, if any, particular to a patient because of a complicating medical condition, either told to the physician or other health care provider by the patient or his representative in a medical history of the patient or reasonably discoverable by such physician or other health care provider.
3. Disclosure of reasonable therapeutic alternative and risks associated with such alternatives.
4. Relate that he is obtaining a consent to medical treatment pursuant to the lists formulated by the Louisiana Medical Disclosure Panel.
5. Provide an opportunity to ask any questions about the contemplated medical or surgical procedure, risks, or alternatives and acknowledge in writing that he answered such questions, to the patient or other person authorized to give consent to medical treatment, receipt of which shall be acknowledged in writing.

As of April, 2000, the Louisiana Medical Disclosure Panel has determined the risks required to be disclosed for 176 different procedures, and continues to meet to update their findings.

Physician-Patient Communication

Informed consent laws have determined that patients should be provided a great deal of information about their illness and treatment. But do patients want all of this information? A number of studies indicate that the vast majority of people (with the

possible exception of elderly patients) desire to be informed about their care, even if it includes negative information (Benbassat, Pilpel, & Tidhar, 1998; Deber, 1994; Guadagnoli & Ward, 1998; Mazur & Hickam, 1997a, 1997b; Strull, Lo, & Charles, 1984; Thompson, Pitts, & Schwankovsky, 1993). Lidz et al. (1983) identified four reasons why patients wish to be informed: (1) to facilitate compliance; (2) to be shown respect; (3) to overrule physicians' decisions (rarely); and (4) to play an active role in decision making (only 10% of the patients).

Studies comparing patients (Degner & Sloan, 1992; Strull et al., 1984) and non-patients (Deber, Kraetschmer, & Irvie, 1996; Degner & Sloan, 1992; Strull et al., 1984) have found that non-patients report a higher desire for information (Benbassat et al., 1998; Degner, 1998; Degner & Sloan, 1992). This occurs even when hypothetical situations are presented to both populations (Ende, Kazis, Ash, & Moskowitz, 1989). Benbassat et al. (1998) suggest that non-patient preferences may reflect ideal or normative expectations, while those elicited from patients (typically with chronic illness) reflect more realistic expectations. Thus, one potential problem with jurors determining liability is that their desire for information may be different from the patients who must actually make the treatment choice.

Since it is clear that patients desire to be informed, one must next consider the patient's ability to understand the information they are given. No matter how much information is disclosed, if the patient does not understand it, then informed consent has not been achieved (Faden & Beauchamp, 1986). Common sense suggests that the information needs to be presented in concise, non-technical ways, although it is not clear

as to what is the “best” way to present the information (Entwistle, Sheldon, Sowden, & Watt, 1998; Levinson, 1997).

One area that may be particularly problematic is the communication of the risks involved with a given procedure. This information is often described in probabilistic terms and a great amount of research has shown that people are generally poor processors of probabilistic information (Kahneman, Slovic, & Tversky, 1982; Kahneman & Tversky, 1972; Saks & Kidd, 1980; Weinstein, 1999), especially when the probabilities involved are less than 1%, which is often the case in medical risk communication (Camerer & Kunreuther, 1989; Halpern, Blackman, & Salzman, 1989; Kahneman & Tversky, 1979; Stone, Yates, & Parker, 1994).

How the probabilistic information is expressed can also be problematic because physicians (and other professionals) prefer to use verbal expressions of probability (e.g., “rare” or “common”) when discussing uncertainty (Beyth-Marom, 1982; Eddy, 1990; Merz, Druzdzel, & Mazur, 1991; Wallsten, Budescu, Rapoport, Zwick, & Forsyth, 1986). Not only have the interpretations of these expressions been shown to be highly variable (Beyth-Marom, 1982; Budescu & Wallsten, 1985; Cohen, Dearnley, & Hansel, 1958; Lichtenstein & Newman, 1967), but the manner in which people use them has also been shown to be inconsistent (Beyth-Marom, 1982; Budescu & Wallsten, 1985; but see Kong, Barnett, Mosteller, & Youtz, 1986 for an exception).

This lack of clear consistency has caused some commentators to suggest that expressions of uncertainty should always be made with a quantitative estimate (Nakao & Axelrod, 1983; Shaw & Dear, 1990). This is bolstered by the evidence that even though

people prefer to give estimates of probability using verbal phrases, they prefer to receive estimates of probability in numeric form (Erev & Cohen, 1990; Moxey & Sanford, 2000; Olsen & Budescu, 1997; Shaw & Dear, 1990). However, it is not clear that patients would necessarily understand and use quantitative estimates appropriately since, as mentioned above, people are not good processors of probabilistic information (Kahneman et al., 1982; Kahneman & Tversky, 1972). Furthermore, there are multiple ways in which to present quantitative information (i.e., percentages, frequencies, and probabilities), and these may be interpreted differently.

Juror Reactions to Probability Evidence

With improved technology (e.g., computer modeling and data analysis programs) and scientific advances (e.g., DNA typing), the amount and type of statistical and probability evidence that is available for use has greatly increased (Faigman & Baglioni, 1988; Schklar & Diamond, 1999). The courts, however, have typically greeted statistical and probabilistic evidence with skepticism and suspicion (Ellsworth & Mauro, 1998; Koehler, 1992). Some legal commentators have claimed that because people (including judges) have a difficult time understanding probabilities, the potential for abuse is high (Tribe, 1971). One argument is that probabilistic evidence gives the appearance of precision, and as such, jurors will place too much weight on this evidence (Tribe, 1971). Another criticism of probabilistic evidence is that because it only describes what happens in general, it is useless for judging what happened in a particular case (Ellsworth & Mauro, 1998; Tribe, 1971). Indeed some jurisdictions have used

these reasons to deny the inclusion of associative evidence⁵ (although the majority of jurisdictions allow it), such as blood and fiber matching (Jonakait, 1983; Thompson & Schumann, 1987).

The empirical evidence, though, indicates that people actually underweight probability information in both legal (Faigman & Baglioni, 1988; Goodman, 1992; Schklar & Diamond, 1999; Smith, Penrod, Otto, & Park, 1996; Thompson & Schumann, 1987) and non-legal (Kahneman et al., 1982; Kahneman & Tversky, 1972; Saks & Kidd, 1980) contexts. Saks and Kidd (1980) even suggest that rather than being overwhelmed by statistical information, triers of fact are likely to ignore it.

While the above studies suggest that mock jurors would not overemphasize probabilistic information, they indicate that people neither intuitively understand the rules of statistical inference (Lichtenstein, Slovic, Fischhoff, Layman, & Coombs, 1978; Nisbet & Ross, 1980) nor properly integrate probabilistic information (Bar-Hillel, 1980; Fischhoff & Beth-Marom, 1983; Kahneman et al., 1982; Tversky & Kahneman, 1981). One suggested approach to improve probabilistic reasoning in the courts is to present expert testimony on how to interpret probabilistic information properly (Faigman & Baglioni, 1988; Finkelstein & Farley, 1970). This testimony would focus on the use of Bayes' theorem to combine statistical and probabilistic evidence that might otherwise be difficult to understand (Finkelstein & Farley, 1970). Unfortunately this approach has not met with much success (Faigman & Baglioni, 1988; Goodman, 1992; Schklar &

⁵Associative evidence refers to matches that can be established between evidence found at the scene and the defendant. This includes DNA, hair, soil, glass, paint, and bodily fluid matching.

Diamond, 1999; Slovic, Monahan, & MacGregor, 2000; Smith, Penrod, Otto, & Park, 1996).

Recently, though, a number of studies have found that Bayesian reasoning can be improved by presenting probability information as frequencies instead of as percentages (Gigerenzer & Hoffrage, 1995; Hoffrage & Gigerenzer, 1998; Slovic et al., 2000). This is consistent with a growing amount of research indicating that some cognitive biases (e.g., base rate neglect, overconfidence, and the conjunction fallacy) can be eliminated by using frequency information as opposed to percentages (Cosmides & Tooby, 1996; Fiedler, 1988; Gigerenzer, Hoffrage, & Kleinbolting, 1991). This issue will be more fully explored in Experiment 2.

Current Experiments

When jurors are presented with a lack of informed consent case, the plaintiff is claiming that either the risk was not disclosed at all, or the amount of information provided about the risk was insufficient to make a reasonable choice (i.e., the patient would have chosen differently had more information been provided). For any treatment, there is a vast amount of information that could be conveyed to the patient. While informed consent laws have increased the amount of information that patients receive, there are still no guidelines indicating how much is enough.

One might suggest that health care providers just give patients all the available information. However, presenting too much information may result in cognitive overload, thereby impairing comprehension (Doak, Doak, Friedell, & Meade, 1998; Jolly, Scott, & Sanford, 1995). Providing too much information may also be detrimental

in a lawsuit. Goebert (1979) suggests that the longer the informed consent form is, the less likely the patient will have read the fine print and the sooner a jury will realize that the patient signed a document which he/she did not understand.

Health care providers are also limited in the amount of time they are able to spend with each patient. Studies have shown that physicians spend an average of about 15-20 minutes with patients in both routine visits (Levinson et al., 1997) and visits to discuss specific procedures (Mark & Spiro, 1990). As such, health care providers face the difficult challenge of determining which information should be disclosed in the limited amount of time they have. Then, they must make sure that the patient can understand the information. Thus, it would be beneficial to determine what information patients need to know, as well as the best way to present that information. Since Louisiana has created the Medical Disclosure panel to address the former, the current studies will focus on the latter.

As stated earlier, people generally do not process probabilistic information very well (Kahneman et al., 1982). Three experiments have been designed to explore the factors surrounding the communication of the risks associated with undergoing surgery to remove a tumor. Even though health care providers typically prefer to provide probability estimates using verbal expressions (Beth-Marom, 1982; Eddy, 1990; Merz et al., 1991; Wallsten et al., 1986), the high variability found in the interpretations of these expressions have led to the suggestion that risk communication for medical procedures always include a quantitative estimate (Nakao & Axelrod, 1983; Shaw & Dear, 1990). However, no study has examined how jurors respond to probability information

presented either verbally or quantitatively in a medical malpractice case. The first experiment addresses this issue, using a summary of a medical malpractice case based on a lack of informed consent.

While little research has directly compared verbal and quantitative estimates, there has been a great deal of interest in comparing different formats (i.e., frequencies versus percentages) of quantitative estimates (Cosmides & Tooby, 1996; Gigerenzer & Hoffrage, 1995; Thompson & Schumann, 1987; Slovic et al., 2000). The typical finding is that participants respond differently to each probability format, with better comprehension and reasoning being associated with the frequency format. However, this research has focused mainly on associative evidence in criminal trials, such as blood or DNA matching. Experiment 2 extends this comparison to a civil trial using the same case summary as Experiment 1.

In addition to comparing probability formats, there has also been a great deal of interest in assessing “psychological uncertainty” (Epstein, 1994; Kirkpatrick & Epstein, 1992; Miller, Turnbull, & McFarland, 1989; Windschitl & Wells, 1996). Psychological uncertainty refers to the different representations of mathematically equivalent information presented as frequencies. For example, the proportion of 10% could be represented as either 1 out of 10 or as 10 out of 100. These studies typically find that participants prefer the option for which they can imagine the desired outcome occurring the most often (e.g., 10/100 for a chance at drawing a winning lottery ticket; Epstein, 1994; Kirkpatrick & Epstein, 1992; Miller et al., 1989). However, these studies rely

almost exclusively on lottery tasks. Experiment 3 examines whether adjusting the psychological uncertainty of an event will affect judgments in a civil trial.

In all three experiments, the issue at trial is whether mock jurors view the risk of the injury sustained during medical treatment as reasonably foreseeable prior to undergoing the surgery. The focus will be on how the probability of the risk occurring is explained (as the reason why the information was not disclosed). In doing so, these experiments will not only extend the research on risk communication and probabilistic reasoning mentioned above to civil trials, but they will also provide health care providers with valuable information about ways to improve communication with their patients and avoid malpractice claims.

Experiment 1: Verbal vs. Quantitative Expressions of Probability

People prefer to give estimates of probability using verbal expressions but prefer to receive estimates in numeric form (Erev & Cohen, 1990; Olson & Budescu, 1997; Shaw & Dear, 1990). This sets up a non-optimal situation for the transmission of risk information from health care provider to patient. Since informed consent laws focus on the understanding of the patient, the inherent vagueness associated with verbal expressions has led many to suggest that health care providers go against their preference and provide quantitative expressions of risk (Nakao & Axelrod, 1983; Shaw & Dear, 1990). This suggestion, though, is typically made following mapping studies (where participants provide quantitative estimates of verbal expressions) which do not address how people use probability expressions. Indeed, while there is a great deal of commentary on the issue (Cliff, 1990; Cohen et al., 1958; Kadane, 1990; Kreuter, 1999; Mapes, 1979; Nakao & Axelrod, 1983; Rothman & Kiviniemi, 1999; Shaw & Dear, 1990; Tanur, 1990), few studies have directly compared verbal and quantitative expressions (e.g., Erev & Cohen, 1990; Teigen & Brun, 1999; Windschitl & Wells, 1995), and those that have do not show an advantage for quantitative expressions.

Erev and Cohen (1990) had participants rate the attractiveness of gambles on the outcome of basketball games (e.g., Player 1 will score more than Player 2). These gambles were accompanied by predictions from an expert (sportswriters and broadcasters) about the probability of the event occurring in either a verbal or quantitative format. They found that while most experts preferred to provide their estimates verbally, and most participants preferred to receive the estimates quantitatively,

the probability format did not influence which gambles participants preferred to take. On the other hand, Windschitl and Wells (1995) found that verbal estimates of being able to answer an unknown trivia question (participants were given the topic area) were better predictors of the questions participants chose to answer than quantitative estimates. They also showed that verbal measures of uncertainty were more sensitive to variations of psychological uncertainty than numeric measures. Note that this goes against peoples' preference for receiving probabilistic information in a quantitative format. Finally, Teigen and Brun (1999) showed that quantitative estimates of the efficacy of a proposed treatment for migraines led to more recommendations to undergo the treatment than when a negative verbal estimate was used (i.e., "quite uncertain"), but fewer recommendations to undergo the treatment when a positive verbal estimate was used (i.e., "some possibility of success").

As can be seen from the above studies, other than decision makers preferring to receive probabilistic information in quantitative form, as yet, there does not appear to be any clear consensus concerning what effect, if any, the format of the probability estimate has. Of the three studies comparing verbal and quantitative expressions, one found no differences (Erev & Cohen, 1990), one found advantages for verbal expressions (Windschitl & Wells, 1995), and one found some verbal expressions increased the number of recommendations to undergo a medical procedure, while other verbal expressions decreased the number of recommendations (Teigen & Brun, 1999).

Experiment 1 was designed to provide additional evidence on this issue by determining

how participants interpret and make decisions based on verbal or quantitative expressions of probability in a medical malpractice trial.

Mapping

In order to compare the effects that the expression of probability has on juror decisions, one must find the quantitative equivalents of the verbal expressions of probability.⁶ Numerous studies have set out to determine the quantitative equivalents for various verbal expressions (Beyth-Marom, 1982; Budescu & Wallsten, 1985; Cohen et al., 1958; Hamm, 1991; Kong et al., 1986; Lichtenstein & Newman, 1967; Mapes, 1979; Mazur & Merz, 1994a, 1994b; Merz et al., 1991; Mosteller & Youtz, 1990; Olson & Budescu, 1997; Reagan, Mosteller, & Youtz, 1989; Shaw & Dear, 1990; Wallsten et al., 1986; Windschitl & Weber, 1999). Reagan et al. (1989) in reviewing 37 studies over two decades found that 282 different expressions had been mapped. Even though these studies used different methodologies (i.e., type of scale used or the order in which terms were presented) there was considerable agreement in the average ratings for the verbal expressions (Reagan et al, 1989).

However, one factor has been found to influence the quantitative estimates of verbal expressions: the context in which the verbal expressions are framed (Hamm, 1991; Mapes, 1979; Mosteller & Youtz, 1990; Nakao & Axelrod, 1983; Pepper & Prytulak, 1974; Tanur, 1990; Wallsten & Budescu, 1990; Windschitl & Weber, 1999; Winkler, 1990; Wolf, 1990). For example, verbal estimates referring to a medical diagnosis yield

⁶One could also find the verbal equivalents of quantitative expressions, but the vast majority of research has focused on the former.

different numerical estimates than when no referent is provided (Mapes, 1979). One explanation for this is that while the word meaning stays the same, the word use changes with the context (Clark, 1990). That is, expressions of probability are relative judgments and the norm with which we make the comparison changes with the context (i.e., the norm for tall differs when referring to people than when referring to trees).

Three studies have examined numeric interpretations specifically in patient populations (Mazur & Merz, 1994a, 1994b; Sutherland et al., 1991). Sutherland et al. (1991) had cancer patients give a numerical value for 18 word phrases used to describe risks in connection with fatal and nonfatal outcomes of a viral infection from blood transfusions. While large variability was found in patients' numeric interpretations across all of the word phrases, no significant differences were found due to the severity (fatal vs. nonfatal) of the outcome. While this could be taken as evidence against context affecting the interpretations, it was most likely due to the scale they used, as nearly half of the patients chose the lowest value on the scale. As such, Mazur and Merz (1994a) found that when more options were included at the low end of the scale used by Sutherland et al., participants not only assigned lower probabilities but the probability estimates became lower the more severe the outcome. Thus, they found support for the context influencing interpretations.

Because of the differences due to the scale used, Mazur and Merz (1994b), repeated the above study without including a scale. Instead, following the presentation of the case, patients were asked "1 out of how many patients would have the adverse outcome if the physician told you the chance of the outcome was rare?" Again, large

variability was found in patients' interpretations of verbal expressions of probability with the probabilities becoming lower the more severe the outcome. This is yet another example of differences due to the context. They also found that personal characteristics of the patients influenced their interpretations of the verbal terms. For example, older patients (above 65 years old) responded with higher probabilities than younger patients (below 65 years old), and those who perceived themselves to be in extremely good or very good health responded with lower probabilities than other patients.

In addition to the above empirical studies, Merz et al. (1991) examined the quantitative equivalents of verbal expressions of probability that were used in actual informed consent cases. They reviewed appellate and trial court opinions from 1951 through 1989 which included a verbal expression of probability presented by a physician (either as a defendant or an expert witness) and the corresponding quantitative estimate. They were able to map 32 expressions in this way. As in the experimental mapping studies, they found large variability in the interpretation of verbal expressions. Unfortunately, they did not have enough data to examine the effect the severity of the injury had on these interpretations.

Injury Severity

Jurors have a tendency to be influenced by "extra-legal" factors when deciding liability and determining damage awards (Bornstein & Rajki, 1994; Cather, Greene, & Durham, 1996; Feigenson, Park, & Salovey, 1997; Goodman, Greene, & Loftus, 1989; Hans & Vidmar, 1986) even when they are told that they should not be swayed or influenced by any sympathy or prejudice for or against any of the parties (Feigenson et

al., 1997; Wright & Ankerman, 1993). One extra-legal factor that has been shown to affect liability decisions is the severity of the injury suffered (Bornstein, 1998). The “severity effect” holds that the greater the harm, the more responsible the person who caused it (Wallsten, 1966). This finding has been found for both product liability (Bornstein, 1998) and medical malpractice cases (Bovbjerg et al., 1991). Bornstein (1998) found that verdicts in favor of the plaintiff were more likely for those severely injured, but the effect was mediated by sympathy for the plaintiff (i.e., more severe injury led to more sympathy for the plaintiff which led to more verdicts in plaintiff’s favor). Similarly, Feigenson et al., (1997) found that when attributing fault and awarding damages, participants were especially sensitive to the blameworthiness of the victim when the consequences of the accident were severe rather than mild.

In a slightly different vein, Caplan, Posner, & Cheney (1991) found that ratings of appropriateness of care, as judged by anesthesiologists reviewing cases involving adverse outcomes, changed with the severity of the outcome. In their study, the more severe the negative outcome the lower the proportion of appropriate care ratings. Note that these differences due to severity can also be construed as examples of the context influencing decisions.

While the severity of the injury is considered an extra-legal factor in liability determinations, compensatory damage awards are expected to be influenced by severity, and the evidence generally indicates that gross damage awards do roughly correlate with the severity of the victim’s injury (Bovbjerg, Sloan, Dor, & Hsieh, 1991; Rodgers, 1991; Rodriguez & Boggett, 1989; Vidmar, 1995; see Cather, Greene, & Durham, 1996 for an

exception). Brennan, Sox, & Burstin (1996) in reviewing actual malpractice cases found the severity of the injury to be the only significant predictor of the damage award.

In the above examples, severity has been defined as the negative outcome either in a products liability case or medical malpractice case. Severity though can also influence decisions prior to the knowledge of an outcome in its influence on participants' desire to participate in their treatment decision making (Beisecker, 1988; Blanchard, Labreque, Ruckdeschel, & Blanchard, 1988; Ende et al., 1989). Ende et al. (1989) reported that the more serious the hypothetical disease situation, the less patients wanted to be involved in decisions. This tendency was supported by Blanchard et al. (1988), who found that those who preferred the health care provider to make the decisions had a lower performance status (i.e., were more severely injured). This may come about because as the severity of the illness increases, patients may feel that they do not possess adequate knowledge concerning the illness to participate effectively in treatment decision-making (Thompson et al., 1993). This could play an important role in trials in that jurors will most likely be in better health than patients or plaintiffs, and thus would want to be more active in their treatment. That being the case, they would most likely require more information from the physician. Thus, when asked to determine what a reasonable person would need to know, their reference point may be different from someone who is ill at the time.

Experiment 1 uses a medical malpractice case to examine if the type of probability expression used (i.e. verbal or quantitative) influences mock juror decisions. It will also explore the effect the severity of the injury has in connection with

participants' interpretation of the probabilities. Finally, because it has been suggested that the more severe the possible risk, the lower the threshold for disclosure (Faden & Beauchamp, 1986), Experiment 1 will also manipulate the probability of the risk.

Hypotheses

Two of the basic requirements for obtaining an informed consent are (1) to disclose the probable adverse outcomes of medical and/or surgical interventions and (2) to disclose the risks that are reasonably foreseeable at the time that consent is obtained. Taken together, these two requirements suggest that physicians should inform the patient of a risk the more likely that risk is to occur. As such, Hypothesis 1 states:

Hypothesis 1.1 Mock jurors will find the defendant liable more often, award more in damages, assign the defendant more liability, provide more favorable ratings of the plaintiff, and rate the plaintiff as being less informed as the likelihood of the outcome increases.

Note that Hypothesis 1 is a direct test of whether mock jurors follow informed consent law which previous research in this area has not done.

Previous research has shown that the severity of the injury affects both damage awards and liability decisions such that the more severe the injury the greater the damage award and the more liability decisions against the defendant (Bornstein, 1998; Bovbjerg et al., 1991; Feigenson et al., 1997). As such, Hypothesis 2 states:

Hypothesis 1.2 For the more severe injury mock jurors will find the defendant liable more often, award more in damages, assign the defendant more liability, have more favorable ratings of the plaintiff, and rate the plaintiff as being less informed.

Previous research is mixed on whether verbal expressions are responded to differently from quantitative ones. Erev and Cohen (1990) failed to find differences,

Windschitl and Wells (1995) found an advantage for verbal expressions, and Teigen and Brun (1999) found quantitative expressions resulted in more recommendations for treatment than negative verbal expressions, but fewer recommendations than positive verbal expressions. These findings, coupled with the fact that the task used in the present study is different from those employed in previous comparisons, provide no clear basis for how mock jurors will react to probability evidence presented either verbally or quantitatively. As such, since two of the previous three studies found some type of difference Hypothesis 3 states:

Hypothesis 1.3 Mock jurors will respond differently to verbal expressions than to quantitative expressions of probability. However, no predictions will be made concerning the direction of these differences.

Method

Participants. Participants were 535 undergraduate students enrolled in introductory psychology classes at a large southeastern university who received extra credit for their participation. Sixty-seven percent of the participants were female and 84% were white. The mean age was 18.83 years (SD = 2.63, Mdn = 18).

Design. Experiment 1 is a 2 (severity of injury) x 3 (probability expression) x 3 (base rate) between subjects design. The three levels of probability expression are if the physician describes non-disclosure of the risk of the plaintiff's injury by using either a verbal expression of probability, a quantitative expression of probability, or a combination of both. Previous studies examining verbal expressions experimentally in a medical context have focused mainly on the interpretation of the word "rare" (Mapes, 1979; Mazur & Merz, 1994a, 1994b). As such, the current experiments will base the

probability estimations on the word rare and its quantitative equivalent. The verbal expressions used will be extremely rare for the low base rate of occurrence, rare for the middle base rate, and uncommon for the high base rate of occurrence. “Uncommon” was chosen because the median value of its quantitative equivalent is considered to be a “low” probability of occurrence (as opposed to high occurrence words such as common, frequent, and great likelihood) by Merz et al. (1991), and is sufficiently different from “rare’s” equivalent that a difference may be expected.

The quantitative equivalents are 6 out of 10,000 for “extremely rare,” 27 out of 10,000 for “rare,” and 630 out of 10,000⁷ for “uncommon” as found in Merz, Druzdzel, and Mazur (1991). The Merz et al. (1991) study is used to determine the quantitative equivalents because it was the only study that includes all of the verbal phrases used in this study (the complete Merz et al. mappings are included in the Appendix). However, it should be noted that the quantitative equivalent to the adjective “rare” used here (27/10000), is approximately equal to the mean value found across the conditions and studies of Mazur and Merz (1994a, 1994b).

The severity of injury is manipulated based on the severity of injury scale used by Merz (1991). This scale is an ordinal ranking of physical consequences ranging from 1 (infection) to 10 (death) and is very similar to a severity scale developed by Daniels and Andrews (1989) for the analysis of medical malpractice issues in the 1970s. For this experiment, two injuries were chosen to represent a moderate and a severe negative

⁷As is apparent, the magnitude of the difference between rare and extremely rare is smaller than that between rare and uncommon. Unfortunately, this was necessary due to the lack of a verbal equivalent of the same difference in magnitude above rare.

outcome. The moderately severe injury is paresthesia (6 on the severity scale), which is an abnormal sensation of the body such as numbness, tingling, or burning. The highly severe injury is quadriplegia (9 on the severity scale).⁸ A pilot study asking participants to rank the severity of these injuries on a 7-point scale verified that quadriplegia ($M = 6.56$, $SD = 0.81$, $n = 16$) is viewed as a more severe outcome than paresthesia ($M = 4.71$, $SD = 1.26$, $n = 17$), $t(31) = 4.98$, $p < .05$. The results of this pilot study also indicated that overall, there was an approximately equal split between liable (47%) and not liable (53%) verdicts.

Materials. A two-page case summary was chosen for this experiment to ensure the salience of the reasoning for non-disclosure of the risk of the injury sustained. The summary is based on an actual case in which the plaintiff successfully sued on a claim of a lack of informed consent (Gibbons, 1999). The summary includes sections on the facts of the case, the plaintiff's claims, the defendant's claims, and a description of informed consent law. Also included with the case summary is the informed consent form signed by the plaintiff. This form is one that is currently used by the Earl K. Long Medical Center in Baton Rouge, Louisiana.

The facts of the case include a description of the plaintiff, what led her to seek treatment in the first place, the discovery of a tumor, the decision to undergo surgery to remove the tumor, the outcome of the surgery (e.g., injury to the spinal cord resulting in

⁸Death (10 on the severity scale) was not chosen as the severe outcome because the trend is for higher damage awards the more severe the injury until death, then there is a drop in the damages awarded (Bovbjerg et al., 1991). In order to avoid any odd findings associated with death, the next most severe injury was chosen.

either paresthesia or quadriplegia), and a statement indicating that the issue for the case is informed consent, not the competency of the physician during the surgery. The plaintiff's case states that the physician never informed the plaintiff of the risk of her injury occurring and produces the consent form which does not list the risk for her injury as evidence. The defendant's case describes how much time the physician spent discussing the surgery with the plaintiff, and indicates that the risk was not disclosed because it does not occur often enough to warrant disclosure.

The description of informed consent law identifies the information required, the consent standard (what a reasonable person would want to know), and the legal standard for civil trials (preponderance of the evidence). It also states that if the physician is found liable, then the plaintiff is entitled to compensation and describes the effects the injury has had on her life. An *ad damnum*⁹ is not included because the manipulation of the severity of the injury is expected to produce different damage awards. Previous research has shown that, when included, the *ad damnum* is the modal amount awarded (Chapman & Bornstein, 1996; Goodman et al., 1989; Raitz, Greene, Goodman, & Loftus, 1990; Zickafoose & Bornstein, 1999). That being the case, if the *ad damnum* is kept constant across the severity conditions, then it is likely that no differences in damage awards would be found between the conditions. Alternatively, if different *ad damnums* are presented for each severity manipulation, then it will not be clear if differences are due to the severity of the injury or to participants' anchoring on the *ad damnum*.

⁹An *ad damnum* is the amount in damages that is requested by the plaintiff.

Dependent Variables. Participants made their decisions using a verdict form containing (1) a verdict choice (liable / not liable for malpractice), (2) a total damage award (for those who found the defendant liable), (3) a determination of the percentage of responsibility attributed to each party (culpability), (4) a rating of the degree to which the consent was informed (7-point likert scale) and (5) overall perception ratings of both the plaintiff and the physician (7-point likert scale). Participants were also asked to rate their agreement with the following questions (7-point likert scale).

A reasonable person would require to be informed about the potential risk of quadriplegia (paresthesia) for this surgery, in order to make an informed decision about whether or not to undergo the procedure.

Had Mrs. Emerson known of the risk of quadriplegia (paresthesia), she would NOT HAVE decided to undergo the surgery.

Informed consent statutes require that both of these statements be responded to in the affirmative for a physician to be found liable for a lack of informed consent. Participants were asked for their agreement to these statements for two reasons. First, they serve as a check to determine if participants conform to the legal prescription. And second, they help to determine if the defense's strategy was effective for one statement, but not the other (i.e., mock jurors may have decided that a reasonable person would want to know the information, but that it would not have affected the decision to undergo treatment).

Procedure. Participants read the case summary and a copy of the informed consent form and then completed the verdict form individually. There was no deliberation, and the entire process took approximately 10-15 minutes.

Results

The liability judgments were subjected to a logistic regression with expression, severity, and base rate entered as categorical predictor variables. Due to the unexpectedly low number of participants returning liable verdicts (39% across all conditions), there was insufficient sample size for a complete factorial analysis of the damage awards. As such, participants were collapsed across conditions in order to carry out planned comparisons of main effects concerning the hypotheses on the natural log of the damage awards (one-way ANOVAs for base rate and expression of probability, and an independent t-test for injury severity). The natural log was used to account for the skewed nature of the data that is expected when damage awards are collected (Cather et al., 1996; Chapman & Bornstein, 1996; Moller, 1996, 1997; Shanley, 1985; Wissler, Evans, Hart, Morry, & Saks, 1997; Zickafoose and Bornstein, 1999).¹⁰ All other dependent variables were subjected to a 2x3x3 between subjects ANOVA.

Hypothesis 1.1 states that mock jurors will find the defendant liable more often, award more in damages, assign the defendant more liability (culpability), provide more favorable ratings of the plaintiff, and rate the plaintiff as being less informed as the likelihood of the outcome increases. The base rate of the injury occurring did not significantly effect any of these variables. See Table 1 for means and significance levels. The ratings of how informed the plaintiff was marginally significant though with post-hoc

¹⁰Analyses were also conducted on the median (of the raw damage awards) amounts awarded. While these analyses did not result in different findings the medians will be provided for illustrative purposes.

Table 1. Means (standard deviations), cell sizes, and significance levels for base rate.

Base Rate	Liability Decision	Culpability	Impression of Plaintiff	Plaintiff Informedness	Damage Award	Ratings of Injury Severity
Low	.35 $\underline{n} = 172$	55.83 (24.90) $\underline{n} = 169$	3.83 (1.16) $\underline{n} = 176$	5.05 _a (1.23) $\underline{n} = 175$	12.25 (2.25) $\underline{n} = 55$	5.91 _a (1.26) $\underline{n} = 175$
Middle	.40 $\underline{n} = 174$	55.50 (25.80) $\underline{n} = 167$	3.99 (1.22) $\underline{n} = 177$	4.89 _{ab} (1.37) $\underline{n} = 175$	12.36 (1.95) $\underline{n} = 68$	5.71 _a (1.15) $\underline{n} = 176$
High	.43 $\underline{n} = 178$	56.18 (27.37) $\underline{n} = 177$	3.76 (1.32) $\underline{n} = 182$	4.73 _b (1.42) $\underline{n} = 180$	12.06 (2.23) $\underline{n} = 76$	5.46 _b (1.40) $\underline{n} = 182$
Sign.	\underline{p} 's < .75 \underline{p} 's > .15	$\underline{F}(2,495) = 0.03$ $\underline{p} = .97$	$\underline{F}(2,517) = 1.69$ $\underline{p} = .19$	$\underline{F}(2,512) = 2.58$.05 < \underline{p} < .10	$\underline{F}(2,196) = .291$ $\underline{p} = .75$	$\underline{F}(2,515) = 7.84$ $\underline{p} < .001$

Note. Within a column, means with same subscript are not significantly different from each other at $p < .05$. Damage awards are in the form of the natural log.

analyses indicating that the plaintiff was rated as being significantly more informed in the low base condition than the high base rate condition ($t(355) = 2.25, p < .05, \eta^2 = .010$). The middle base rate condition was not significantly different from either of the other base rate conditions (t 's $< 1.18, p$'s $> .24$).

Interestingly, the base rate of the injury occurring did significantly affect the ratings of the severity of the injury, $F(2,515) = 7.84, p < .05, \eta^2 = .03$. Here, the high base rate condition was rated as significantly less severe than the low base rate condition, $t(357) = 3.96, p < .001$, and the middle base rate condition, $t(358) = 2.19, p < .05$. The difference between the low and middle conditions was marginally significant, $t(351) = 1.76, .05 < p < .10$. See Table 1 for the means and standard deviations.

In other words, while the base rate did not directly impact the liability, culpability, or damage awards, it did influence perceptions of the severity of the injury and ratings of how informed the patient was.

Hypothesis 1.2 states that mock jurors will find the defendant liable more often, award more in damages, assign the defendant more liability, have more favorable ratings of the plaintiff, and rate the plaintiff as being less informed as the injury becomes more severe. The means and standard deviations are presented in Table 2. The severity of the injury was found to be a significant predictor of the liability decision, $\beta = 1.39, p < .05$, with participants finding the defendant liable more often when the surgery resulted in quadriplegia (45%) than when it resulted in paresthesia (33%). There was also a significant main effect for defendant culpability, $F(1,495) = 4.47, p < .05, \eta^2 = .009$, with participants finding the defendant more culpable when the surgery resulted in

Table 2. Means (standard deviations), cell sizes, and significance levels for injury severity.

Injury Severity	Liability Decision	Culpability	Impression of Plaintiff	Plaintiff Informedness	Damage Award	Ratings of Injury Severity
Moderate	.33 $n = 262$	53.37 (25.91) $n = 258$	3.75 (1.20) $n = 267$	4.98 (1.35) $n = 265$	11.81 (1.97) $n = 82$	5.01 (1.23) $n = 268$
Severe	.45 $n = 262$	58.35 (25.94) $n = 255$	3.97 (1.27) $n = 268$	4.79 (1.35) $n = 265$	12.49 (2.21) $n = 117$	6.38 (0.94) $n = 265$
Sign.	$\beta = 1.39$ $p < .05$	$F(1,495) = 4.47$ $p < .05$	$F(1,517) = 4.46$ $p < .05$	$F(1,512) = 2.53$ $p = .11$	$t(197) = 2.22$ $p < .05$	$F(1,515) = 212.73$ $p < .001$

quadriplegia, as opposed to paresthesia. This main effect was qualified by a the three-way interaction, $F(4,495) = 2.82$, $p < .05$, $\eta^2 = .022$, which indicated that severity only had an effect in the high base rate condition when a quantitative expression of probability was used (either alone, $t(60) = 1.86$, $p = .03$, severe: $M = 58.87$, $SD = 26.98$, $n = 31$; moderate: $M = 45.71$, $SD = 28.62$, $n = 31$) or in conjunction with a verbal expression $t(51) = 3.23$, $p < .001$, severe: $M = 69.90$, $SD = 23.30$, $n = 29$; moderate: $M = 46.24$, $SD = 31.76$, $n = 29$). See Figure 1 for graph. The severity of the injury was also found to have a main effect for ratings of the overall impression of the plaintiff, $F(1,517) = 4.46$, $p < .05$, $\eta^2 = .009$, with the plaintiff receiving higher ratings when the injury was more severe.

Again, due to the limited number of participants awarding damages, the data were collapsed across conditions in order to assess Hypothesis 1.2.¹¹ As expected, participants awarded significantly more in damages when the surgery resulted in quadriplegia ($M = \$1,641,291$; $SD = \$5,110,164$; $Mdn = \$500,000$), than paresthesia ($M = \$782,040$; $SD = \$2,014,634$; $Mdn = \$100,000$), $t(197) = 2.22$, $p < .05$, $\eta^2 = .018$.

Contrary to expectations, severity did not significantly effect the ratings of how informed the plaintiff was, $F(1,512) = 2.53$, $p = .11$, although, the means were in the expected direction.

Hypothesis 1.3 predicted that mock jurors would respond differently to verbal expressions than to quantitative expressions of probability. Contrary to expectations,

¹¹None of the other main effects or interactions were significant in the full factorial analysis paving the way for collapsing across conditions.

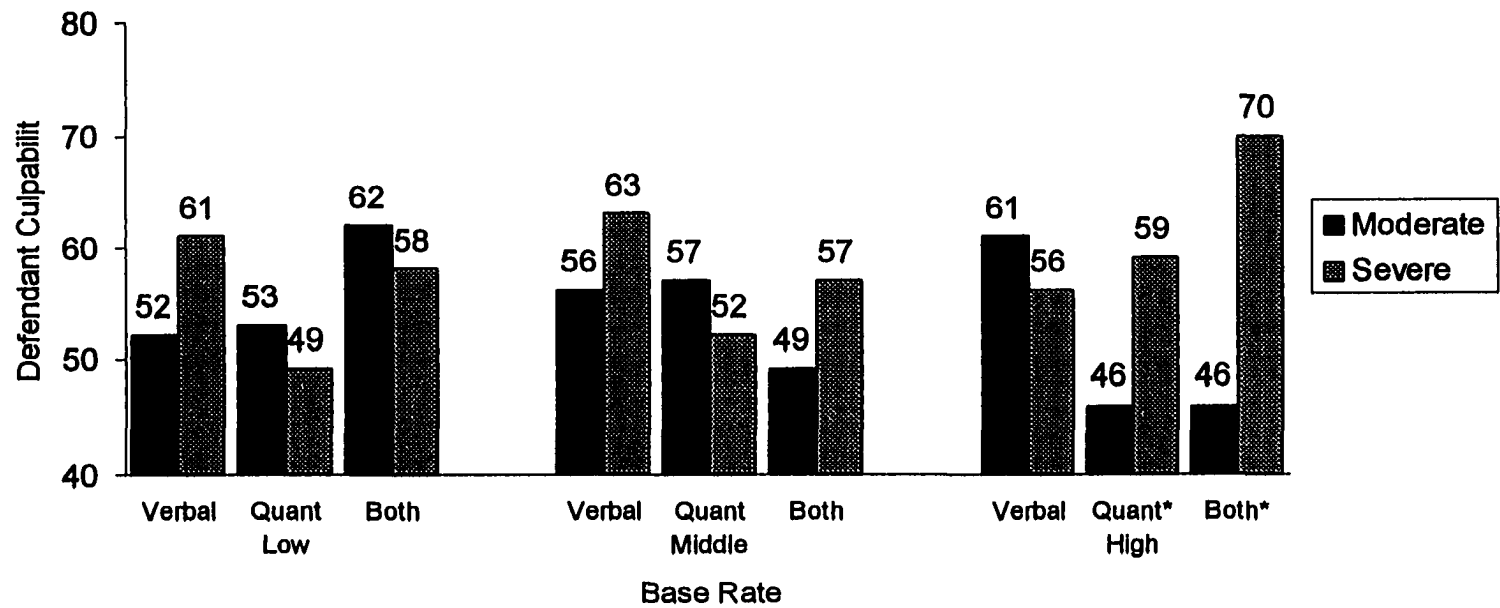


Figure 1. Three way interaction for defendant culpability.

Note. Significant differences between the moderate and severe injuries are indicated by conditions with the *.

how the probabilities were communicated did not reach significance for any of the dependent variables (see Table 3 for means and levels of significance). However, for all the dependent variables, except verdict choice (same percent voting liable), there was a tendency for verbal expressions alone to result in higher scores than the quantitative expressions alone.

Components of Liability. In order to ensure that participants were not treating the questions concerning the two conditions necessary for finding the defendant liable as tapping the same underlying construct, the correlation was computed between them. Since this correlation was fairly low, $r = .23$, it appears that participants treated them as two independent questions, and responses to each question were therefore subjected to separate 2x3x3 between subjects ANOVAs. As with the liability judgments and culpability ratings, there was a main effect of injury, $F(1,517) = 4.02$, $p < .05$, $\eta^2 = .008$, for agreement with the statement that “A reasonable person would require to be informed about the potential risk of quadriplegia (paresthesia) in order to make an informed decision about whether or not to undergo the surgery.” Again, participants agreed with the statement more when the injury was severe ($M = 5.11$, $SD = 1.79$), than when the injury was moderate ($M = 4.80$, $SD = 1.76$). No other main effects or interactions were significant for this variable.

There were no significant main effects or interactions concerning agreement with the statement “Had Mrs. Emerson known of the risk of quadriplegia (paresthesia) she would not have decided to undergo the surgery.”

Table 3. Means (standard deviations), cell sizes, and significance levels according to the expression of probability used.

Probability Expression	Liability Decision	Culpability	Impression of Plaintiff	Plaintiff Informedness	Damage Award
Verbal	.36 $\underline{n} = 172$	57.89 (24.06) $\underline{n} = 167$	3.97 (1.21) $\underline{n} = 176$	4.94 (1.28) $\underline{n} = 174$	12.22 (2.31) $\underline{n} = 61$
Quantitative	.36 $\underline{n} = 178$	52.52 (27.21) $\underline{n} = 172$	3.82 (1.26) $\underline{n} = 180$	4.88 (1.37) $\underline{n} = 178$	11.99 (2.15) $\underline{n} = 64$
Both	.46 $\underline{n} = 174$	57.16 (26.45) $\underline{n} = 174$	3.79 (1.24) $\underline{n} = 179$	4.85 (1.40) $\underline{n} = 178$	12.40 (1.98) $\underline{n} = 74$
Significance	β 's < .82 p 's > .12	$F(2,495) = 2.23$ $p = .11$	$F(2,517) = 1.18$ $p = .32$	$F(2,512) = .171$ $p = .84$	$F(2,196) = .604$ $p = .55$

Note. Median damage awards were \$250,000, \$100,000, and \$250,000 for verbal, quantitative, and both respectively.

Manipulation Check. Participants were asked to rate the severity of the plaintiff's injury after the surgery (7 point scale) as a check on the injury severity manipulation. The responses were subjected to the same 2x3x3 between subjects ANOVA as the rest of the data. As in the pilot studies, quadriplegia ($M = 6.38$, $SD = .94$) was seen as more severe than paresthesia ($M = 5.01$, $SD = 1.23$), $F(1, 515) = 212.71$, $p < .05$. Interestingly, there was also a significant main effect of base rate for the severity ratings. This finding was described above in relation to Hypothesis 1.1.

Supplementary Analyses. Mackauf (1999) has claimed that jurors are willing to forgive almost any malpractice if they like the health care provider (i.e., find him/her to be caring, competent, and compassionate). However, if jurors do not like the health care provider (i.e., find him/her to be arrogant, lazy, or incompetent), they will find against him/her even if no malpractice occurred. If this is true, then one would expect that those deciding in favor of the plaintiff (defendant liable) would also have a better overall impression of her, while those deciding in favor of the defendant (defendant not liable) would also have a better overall impression of him. This is exactly what was found. Participants voting liable had a higher overall impression of the plaintiff, $t(521) = 12.88$, $p < .05$ (liable: $M = 4.61$, $SD = 1.13$, $n = 206$; not liable: $M = 3.37$, $SD = 1.04$, $n = 317$), while those who voted not liable had a higher overall impression of the defendant, $t(519) = 12.54$, $p < .05$ (not liable: $M = 4.63$, $SD = 1.01$, $n = 316$; liable: $M = 3.47$, $SD = 1.05$, $n = 205$).

Discussion

Previous research has indicated that decision makers prefer to receive probabilistic information in quantitative terms (Erev & Cohen, 1990; Olson & Budescu, 1997; Shaw & Dear, 1990). This is thought to be so because quantitative expressions are more precise and informative. Experiment 1 set out to determine if the format of probabilistic information influenced juror decisions. The results of Experiment 1 suggest that the manner in which probabilistic information is communicated (i.e., verbally or quantitatively) does not influence liability, damage awards, or culpability decisions. While this finding is consistent with the results of Erev and Cohen (1990), who failed to find a difference between verbal and quantitative expressions of predictions when rating the attractiveness of gambles on the outcomes of basketball games, it is inconsistent with other findings (Teigen & Brun, 1999; Windschitl & Wells, 1995).

The current study is conceptually similar to that of Teigen and Brun (1999), which asked participants to recommend whether a patient should undergo treatment (acupuncture for migraines) based on the estimate of the efficacy of the proposed treatment. This is akin to the component of liability question concerning whether or not the defendant would have had the surgery had she been given the risk information. Teigen and Brun found that when using negative expressions, quantitative estimates resulted in more recommendations for treatment than verbal estimates. They proposed that positive verbal expressions suggest behaviors in line with the target outcome, whereas negative expressions suggest opposite behaviors. In their study, negative verbal

expressions would suggest that the treatment was unlikely to succeed, thereby resulting in fewer recommendations to undergo the treatment.

Following their description of what are positive (i.e., “some possibility”) and negative (i.e., “quite uncertain”) verbal expressions, the verbal expressions used in the current experiment (i.e., “extremely rare”, “rare”, “uncommon”) would be considered negative expressions. However, the current study differs from that of Teigen and Brun (1999) in that their referent was the likelihood of success of the treatment, while in the current study, the referent was the likelihood of the occurrence of a negative side effect. This effectively reverses the predictions that would be made. For example, if a negative verbal expression suggests that the opposite would occur, one would assume that patients given a negative verbal expression concerning a negative outcome would consider it unlikely for that negative outcome to occur. Thus, it would be expected that participants receiving negative verbal estimates would be more likely to suggest that the patient would have still undergone the surgery, had she been told of the consequences.

The results of the current study, however, do not support this finding. Not only was the F -test not significant in the overall model, $F(2,515) = 2.39$, $p > .05$, but the means reflect the opposite pattern of what Teigen and Brun (1999) would predict, with higher ratings of agreement that the defendant would have had the surgery anyway in the quantitative expression condition ($M = 3.12$, $SD = 1.81$, $n = 179$) than in the verbal expression condition ($M = 3.31$, $SD = 1.81$, $n = 176$).¹²

¹²Note that for this question, lower values reflect more agreement.

A possible reason for the difference between the current study and that of Teigen and Brun (1999) could be the seriousness of the treatment choice involved. In Teigen and Brun, the choice concerned treatment for the relief of migraines. In the current study, the treatment was to remove a tumor. The latter may be a more serious condition resulting in nearly everyone recommending surgery no matter what. Indeed, the means in both conditions suggest that she would have had the surgery. Thus, repeating the current study with a less serious initial condition, thereby making the option of non-treatment more acceptable, might lead to a replication of the results of Teigen and Brun.

A second goal of Experiment 1 was to examine what effect the severity of the injury has on juror decisions. A great deal of evidence exists suggesting that injury severity influences decisions even when it is not supposed to (Bornstein, 1998; Bovbjerg et al., 1991; Feigenson et al., 1997; Wallsten, 1966). This is exactly what was found, with the more severe injury resulting in more liability decisions, higher culpability ratings, larger damage awards, and better overall impressions of the plaintiff. The severe injury also resulted in higher rates of agreement that a reasonable person would have wanted to know of the risk of the injury. However, injury severity did not influence ratings of whether the plaintiff would have still undergone the surgery had she known of the risk. It should be noted, though, that the effect of injury severity was marginally significant ($F(1,515) = 3.45$, $.05 < p < .10$), with participants indicating that the plaintiff would be somewhat less likely to have had the surgery when the injury was severe ($M = 3.47$, $SD = 1.88$, $n = 268$) than when it was moderate ($M = 3.18$, $SD = 1.85$, $n = 265$).

A third goal was to examine what effect the base rate of the injury occurring has on juror decisions. Since possible complications should be disclosed the more likely an injury is to occur, it was expected that mock jurors would find the defendant more liable and award more in damages as the base rate increased. While the trend in liability decisions followed this pattern, it did not reach significance (damage awards did not follow this pattern). One possibility for this lack of significance is that the base rate manipulation may not have registered. That is, participants may not have been able to distinguish between the various base rate levels. Siegrist (1997) suggests that people interpret probabilities as either low or high, and that it is difficult for them to get an accurate feeling for the specific level of the risk. Likewise, Camerer and Kunreuther (1989) state that people ignore risks that fall below a certain threshold (anything below that threshold is viewed as the same). It could be that all 3 base rates were considered below this cutoff and were thus indistinguishable from each other. However, no manipulation check was included to ascertain this possibility.

Finally, Experiment 1 examined Mackauf's (1999) claim that juror decisions are in part based on how much they like the physician (i.e., find him/her to be caring, competent, and compassionate). Consistent with this claim, it was found that those voting liable also had higher overall ratings of the plaintiff, while those voting not liable had higher overall ratings of the defendant. Because the liability decision was not manipulated, we cannot make a direct causal connection between the two, but this information does provide evidence in support of Mackauf's claims.

Experiment 2: Frequency vs. Percentage

Experiment 1 examined whether mock jurors respond differently to probabilities expressed verbally than to probabilities expressed quantitatively. Even though no differences were found in juror responses, the ambiguity inherent in verbal expressions has led many commentators to suggest that health care providers should at least include a quantitative expression when discussing uncertain outcomes, if for no other reason than to improve patient comprehension (Merz et al., 1991; Merz et al., 1993; Nakao & Axelrod, 1983; Olson & Budescu, 1997; Shaw & Dear, 1990). The question then becomes, are all quantitative expressions created equally? The short answer is “no.” Previous research has found that participants respond differently to quantitatively equivalent information presented in different probability formats (Cosmides & Tooby, 1996; Gigerenzer & Hoffrage, 1995; Siegrist, 1997; Slovic et al., 2000; Tversky & Koehler, 1994).

Gigerenzer & Hoffrage (1995) claim that Bayesian algorithms are computationally simpler when probabilistic information is presented as frequencies rather than as percentages. Information presented as frequencies requires fewer operations, the operations can be performed on whole numbers rather than fractions, only two kinds of information need to be attended to (three are required for percentages),¹³ and the information about sample size included in frequencies allows for inferences beyond single point estimates. They presented participants with hundreds of Bayesian problems and

¹³Frequencies only require $d \& h$ and $d \& \neg h$ (where d =data and h =hypothesis). Percentages require $p(H)$, $p(D|H)$, and $p(D|\neg H)$ (often called base rate, hit rate, and false alarm rate respectively)

found that statistically naive participants responded in a Bayesian manner in nearly 50% of the problems when probability information was presented as a frequency. This finding is contrary to the findings of much of the heuristics and biases research (most of which present probability information in the form of percentages), which typically finds less than 20% of the responses conforming to Bayesian reasoning (Kahneman, Slovic, & Tversky, 1982; Tversky & Kahneman, 1972). Mellers and McGraw (1999) agree with Gigerenzer and Hoffrage (1995) that frequencies can improve Bayesian reasoning, but they also show that the base rate plays an important role. They found that probabilities are more difficult to understand than frequencies, especially when events are rare, thus leading to worse Bayesian reasoning.

Cosmides & Tooby (1996) extended these findings using the following medical diagnosis problem:

If a test to detect a disease whose prevalence is 1/1000 has a false positive rate of 5%, what is the chance that a person found to have a positive result actually has the disease, assuming that you know nothing about the person's symptoms or signs? ____ % (Cosmides and Tooby, 1996, p. 21)¹⁴

This problem is well known in the heuristics and biases literature for eliciting base rate neglect, even from technically educated participants such as the faculty, staff, and fourth year students at Harvard Medical School (Casscells, Schoenberger, & Graboys, 1978).

Cosmides & Tooby found that by expressing the problem in frequency terms (i.e.,

¹⁴The correct answer is 2%, but only if one assumes that the true positive rate is 100% (this information was not provided in the original problem), that the population base rate is the appropriate prior probability, and that the individual tested was randomly drawn from the population. If the participant believes any of these assumptions to be false, then other answers are correct according to Bayes' Theorem.

replaced 'false positive rate of 5%' with 'out of every 1000 people who are perfectly healthy, 50 of them test positive for the disease'), 76% of participants showed correct Bayesian reasoning (92% of participants showed Bayesian reasoning in their most ecologically valid condition). Interestingly, Cosmides and Tooby (1996) also found that when just frequency information was presented participants were more likely to engage in Bayesian reasoning than if the information was presented in both frequency and percentages form. This suggests that not only would frequency information aid Bayesian reasoning, but that percentage information might actually hinder it. Some of the other cognitive biases that have been shown to disappear when frequency information is used include the conjunction fallacy (Fiedler, 1988) and overconfidence (Gigerenzer et al., 1991).

In a slightly different vein, Siegrist (1997) presented participants with information about the risk of dying from taking a certain medication (either as a frequency or a probability). He found that the risk format and base rate interacted, such that differences due to the base rate only occurred when the information was presented as a frequency (6 in 1,000,000). When presented as a probability (.000006), there was no difference between the base rates. He concluded that frequency information emphasizes the threat of the risk, and therefore should be used when comprehension of the danger is important. Alternatively, if one wishes to downplay the differences between risk levels, one should present information as a probability.

Presenting information as either a percentage or frequency has also been found to influence mock juror decisions (Thompson & Schumann, 1987). Thompson &

Schumann (1987) had participants read an account of a liquor store robbery, and then determine the suspect's degree of guilt (on a scale from 0-100%) both prior to, and following, the testimony of a forensic expert. The expert testified that a sample of the suspect's hair was microscopically indistinguishable from a hair found inside the robber's ski mask. The expert also described the probability that two hairs drawn at random from different people would be indistinguishable. They found that ratings of guilt were higher when the expert's description was as a percentage (i.e., only a 2% chance the defendant's hair would match the perpetrator's if he were innocent) than when the expert included frequency information in his description (i.e., added to the conditional probability that in a city of 1,000,000 people, 20,000 people would have hair with the same characteristics). The authors suggest that the frequency information encouraged participants to think about the large number of other individuals who could have matched the perpetrator's hair, thereby reducing the likelihood of his guilt.

The above studies have shown that the format of mathematically equivalent information can affect responses across a wide variety of tasks (Cosmides & Tooby, 1996; Fiedler, 1988; Gigerenzer & Hoffrage, 1995; Gigerenzer et al., 1991; Thompson & Schumann, 1987). Experiment 2 is designed to ascertain if the format of probability evidence presented in a medical malpractice trial influences mock juror decisions (i.e., liability decisions and damage awards). To do this, participants are presented with the same malpractice case as used in Experiment 1, with the probabilities for why the information was not disclosed presented as either a frequency, a percentage, or a combination of both. It should be noted that using an informed consent case not only

extends this comparison of frequencies and percentages into a new domain (civil trials), but the manner in which the probabilistic information is used differs greatly from its use in cases involving associative evidence (i.e., matching blood samples, hair samples, and fiber samples to a suspect).

Hypotheses

As in Experiment 1, it is expected that the more likely the injury is to occur, the less favorable decisions will be to the defendant.

Hypothesis 2.1 Mock jurors will find the defendant liable more often, award more in damages, assign the defendant more liability, rate the plaintiff as having been less informed, and provide more favorable ratings of the plaintiff as the likelihood of the outcome increases.

Thompson and Schumann (1987) found that DNA evidence presented as percentages resulted in more guilty verdicts than when presented as frequencies. This result was also found by Koehler and Macchi (1999; as cited in Slovic et al., 2000). The above studies focused on the probability that the suspect was innocent given a match. The explanation provided for the differences is that it is easier to imagine similar alternatives (i.e., other people matching) when probabilistic information is presented as a frequency, thereby making the match appear more likely to have occurred by chance. In the current study, if the frequency format makes it easier to imagine similar alternatives, then the risk of the injury occurring will be viewed as more likely to happen. That being the case, Hypothesis 2 of Experiment 2 states:

Hypothesis 2.2 Mock jurors will find the defendant liable more often, award more in damages, assign the defendant more liability, rate the plaintiff as having been less informed, and provide more favorable ratings of the plaintiff when the risk information is provided as a frequency.

Siegrist (1997) found that the presentation of risk information and the base rate interacted such that differences due to base rates were only found when probabilistic information was presented as a frequency. Similarly, Mellers & McGraw (1999) found that probabilities are more difficult to understand than frequencies, and thus not as easily differentiated when events are rare. Thus, Hypothesis 2 for Experiment 2 predicts an interaction between probability format and base rate such that:

Hypothesis 2.3 Differences between base rates will occur only when the probabilistic information is presented as a frequency. No differences between base rates are expected when presented as a percentage.

Method

Participants. Participants were 179 undergraduate students enrolled in introductory psychology classes at a large southeastern university who received extra credit for their participation. Seventy percent were female and 81% were white. The mean age was 19.51 years (SD = 3.34, Mdn = 19).

Design. Experiment 2 is a 3 (type of expression) x 3 (base rate) between subjects design. The three types of expression are either the probability of the risk occurring expressed as a frequency, a percentage, or a combination of both. Three levels are used for the base rate condition (3%, .3%, .03%, and 3 in 100, 3 in 1,000, 3 in 10,000). Because previous studies examining probabilistic information and informed consent have focused on “rare” occurrences (generally indicated by describing the likelihood of the event as rare) the frequencies chosen for this experiment are based on the quantitative equivalent for the word “rare” (.0027) as found by Merz et al. (1991).

Materials. The same case summary and informed consent form is used as in Experiment 1 with the only changes being how the probabilities are expressed.

Dependent Variables & Procedure. The same dependent variables and procedure as in Experiment 1 are used.

Results

As in Experiment 1, the liability judgments were subjected to a logistic regression with expression and base rate entered as categorical predictor variables. Due to the unexpectedly low number of participants returning liable verdicts (28% across all conditions) there was insufficient sample size for a complete factorial analysis of the damage awards. As such, participants were collapsed across conditions in order to carry out planned comparisons concerning the hypotheses on the natural log of the damage awards (one-way ANOVAs for base rate, and independent t-test for expression of probability). All other dependent variables were subjected to 2x3 between subjects ANOVAs.

Hypothesis 2.1 is the same as in Experiment 1 and states that mock jurors will find the defendant liable more often, award more in damages, assign the defendant more liability, rate the plaintiff as having been less informed, and provide more favorable ratings of the plaintiff as the likelihood of the outcome increases. As in Experiment 1, the base rate of the injury occurring did not significantly affect any of these variables (liability decisions: β 's < .44, p 's > .30; damage awards: $F(2,41) = 0.06$, $p = .94$; defendant culpability: $F(2,164) = 0.63$, $p = .53$; overall rating of the plaintiff: $F(2,173) = 0.47$, $p = .63$; plaintiff informedness: $F(2,171) = 1.89$, $p = .16$).

Hypothesis 2.2 states that mock jurors will find the defendant liable more often, award more in damages, assign the defendant more liability, rate the plaintiff as having been less informed, and provide more favorable ratings of the plaintiff when the risk information is provided as a frequency. Contrary to expectations, the format of the risk information did not influence any of these variables (liability decisions: $\beta = 0.13$, $p = .70$; damage awards: $t(42) = 1.02$, $p = .32$;¹⁵ defendant culpability: $F(1,164) = 1.60$, $p = .21$; overall rating of the plaintiff: $F(1,173) = 0.17$, $p = .68$; plaintiff informedness: $F(1,171) = 0.02$, $p = .90$).

Hypothesis 2.3 predicts an interaction between probability format and base rate such that differences between base rates will only occur when the probabilistic information is presented as a frequency. No differences between base rates are expected when presented as a percentage. As with the main effects, and contrary to what was predicted, the interaction between probability format and base rate was not significant for any of the dependent variables (liability decisions: β 's < 0.44 , p 's $> .30$; damage awards: $F(2,38) = 1.20$, $p = .31$;¹⁶ defendant culpability: $F(2,164) = 0.19$, $p = .82$; overall rating of the plaintiff: $F(2,173) = 0.40$, $p = .67$; plaintiff informedness: $F(2,171) = 0.23$, $p = .80$).

Components of Liability. As in Experiment 1, the two questions concerning the conditions necessary for finding the defendant liable were subjected to 2x3 between

¹⁵Median damage awards were \$100,000 and \$50,000 for percent and frequency respectively.

¹⁶Note that cell sizes ranged from 3 to 9 for this analysis, so the interpretation of the results must be tempered.

subjects ANOVAs.¹⁷ As with the liability judgments and culpability ratings there were no significant main effects nor an interaction (F 's < 1, p 's > .35) for agreement with the statement that "A reasonable person would require to be informed about the potential risk of quadriplegia (paresthesia) in order to make an informed decision about whether or not to undergo the surgery."

However, there was a significant main effect of base rate, $F(2,173) = 3.14$, $p < .05$, $\eta^2 = .035$, for agreement with the statement "Had Mrs. Emerson known of the risk of paresthesia she would not have decided to undergo the surgery." Tukey's LSD post hoc analyses indicated that participants disagreed with the statement more in the low (3 in 10,000/.03%) base rate condition ($M = 2.58$, $SD = 1.73$) than they did for the either the middle (3 in 1000/.3%) condition ($M = 3.36$, $SD = 1.82$), $t(118) = 2.31$, $p < .05$, or the high (3 in 100/3%) condition ($M = 3.25$, $SD = 1.95$), $t(119) = 1.99$, $p < .05$. There was no difference between the middle and high base rate conditions, $t(118) < 1$.

Supplementary Analyses. As in Experiment 1, analyses were conducted to verify the claim of Mackauf (1999) that jurors are willing to forgive almost any malpractice if they like the health care provider (i.e., find him/her to be caring, competent, and compassionate). However, if jurors do not like the health care provider (i.e., find him/her to be arrogant, lazy, or incompetent), they will find against him/her even if no malpractice occurred. Again, evidence was found supporting this claim. Participants

¹⁷As in Experiment 1 the correlation between the two components was low, $r = .31$, suggesting that participants were not treating the two questions as the same, thereby allowing for each question to be analyzed separately.

voting liable had a higher overall impression of the plaintiff, $t(171) = 5.90$, $p < .05$ (liable: $M = 4.31$, $SD = 1.06$; not liable: $M = 3.38$, $SD = 0.89$), while those who voted not liable had a higher overall impression of the defendant, $t(169) = 6.44$, $p < .05$ (not liable: $M = 4.71$, $SD = 0.96$; liable: $M = 3.63$, $SD = 1.02$).

Discussion

Experiment 2 replicated the results of Experiment 1 investigating Mackauf's (1999) claims that liability decisions are related to one's liking of the physician. As in Experiment 1, participants who voted liable also had a better overall impression of the plaintiff, while those who voted not liable had a better overall impression of the defendant.

Experiment 2's main goal of replicating previous research that has found differences when probabilistic information is presented as frequencies, as opposed to percentages, was not successful. While previous research has shown frequency information to increase Bayesian reasoning (Cosmides & Tooby, 1996; Gigerenzer & Hoffrage, 1995), reduce cognitive biases (Fiedler, 1988; Gigerenzer et al., 1991), influence medical decisions (Siegrist, 1997), and reduce the number of guilty verdicts in a criminal trial (Thompson & Schumann, 1987), Experiment 2 failed to find any differences in liability decisions, culpability ratings, damage awards, overall impression of the plaintiff, or ratings of how informed the plaintiff was due to the format of the probabilistic information (frequency vs. percentage). In particular, the results cast doubt on Siegrist's (1997) suggestion that frequency information emphasizes the risk and thus should be used when comprehension of the danger is important. If this is the case, then

one would expect that in a medical malpractice trial concerning a lack of informed consent, the frequency information would emphasize the threat of the non-disclosed risk resulting in more judgments against the physician/defendant. However, this was not the case, as no differences were found due to the probability format.

One possibility for the failure to replicate is that the current study uses a different task (i.e., a civil trial) from any of the previous research. However, the conceptual similarities between the criminal trial of Thompson and Schumann (1987) and the civil trial used in the current study would suggest this is not the case. In both trials probabilistic evidence was presented—hair matching in Thompson and Schumann (1987), and testimony describing why risk information was not disclosed in the current study—and a verdict choice was made (guilt or liability). Thus, the underlying structure of the two studies is similar enough to expect consistent findings. In spite of these similarities, there may be something special about medical malpractice trials. For example, medical malpractice trials typically result in more verdicts in favor of the defendant than other civil trials. Plaintiffs have been found to win only about 20-33% of malpractice trials, while they win between 44-50% of product liability trials (Moller, 1996; Taragin, Willett, Wilczek, Trout, & Carson, 1992). It may be that there is a bias favoring physicians that overrides any effects that the probability format would exert. There is also evidence that malpractice cases result in higher damage awards than other types of cases (Bovbjerg et al., 1991; Chin & Peterson, 1985; Hammitt, Carroll, & Relles, 1985); however, Vidmar (1993, 1995) has provided persuasive evidence countering those claims. Even so, expanding the current studies to cover other types of

civil trials (e.g., product liability) may have more success replicating the previous research.

Another possibility concerning the discrepancy in findings revolves around the explanation that Thompson and Schumann (1987) provided for their results. They suggest that frequency information encourages participants to think about the large number of other individuals who could have matched the perpetrator's hair. Thus, not only does the frequency information force participants to consider the base rate, it suggests that the numbers used in the numerator of the frequency play an important role. That is, the larger the number in the numerator, the more alternatives one is able to generate. In the current study, that would suggest that the larger the numerator, the more times one could imagine the complication actually occurring resulting in more decisions against the physician-defendant. In the current experiment, though, the numerator in the frequency information stayed constant (it was always three), while the denominator was adjusted to manipulate the base rate of occurrence. It could be that participants ignored the denominator and focused on the numerator. This is similar to the idea of psychological uncertainty, which refers to the concept that mathematically equivalent ratios can take on different meanings when the numbers making up the ratio are altered. This concept is more fully addressed in Experiment 3.

As in Experiment 1, Experiment 2 was unsuccessful in eliciting an effect of base rate for liability decisions or damage awards. Again, no manipulation check was included, so it is not clear if participants were able to distinguish between the different base rates. Thus, future studies should ensure that the base rates are being attended to.

A final finding concerns the agreement with the two statements composing the components of liability. As in Experiment 1, the format of the expression of probability did not influence agreement levels with either the statement “A reasonable person would require to be informed about the potential risk of paresthesia...” or the statement “Had Mrs. Emerson known of the risk of paresthesia, she would not have decided to undergo the surgery.” However, participants did agree with the second statement more in the high base rate condition than the low base rate condition. This finding was not found in Experiment 1. However, this may be due to the fact that in Experiment 1, the low base rate condition was based on a verbal equivalent which was not as low as the low base rate used in Experiment 2. Thus, Experiment 1's manipulation may not have been sensitive enough to obtain this difference.

Experiment 3: Psychological Uncertainty

It has been argued that people naturally represent probabilistic information in frequencies (Cosmides & Tooby, 1996; Gigerenzer & Hoffrage, 1995; Hasher & Zacks, 1979; Windschitl & Wells, 1996). It has further been shown that certain cognitive biases (i.e., base rate neglect and conjunction fallacy) can be eliminated when probabilities are expressed as frequencies instead of as percentages (Fiedler, 1988; Gigerenzer et al., 1991). However, Experiment 2 was unable to find a difference between frequencies and percentages. One possibility for the lack of a difference in Experiment 2 is that not all frequencies are created equal, and thus the frequencies used were not sufficient to elicit differences. If that is the case, then one should be able to obtain different responses to different expressions of the same frequencies.

The absolute size of the numbers used to represent a frequency has been shown to influence decisions (Kirkpatrick & Epstein, 1992; Miller, Turnbull, & McFarland, 1989; Windschitl & Wells, 1996). In examining this issue, participants are typically presented with two buckets containing the same ratio of winning tickets but with different absolute numbers (e.g., 1 in 10 or 10 in 100 are winners). Participants are then asked to indicate which bucket they would prefer to draw from. The typical finding is that participants would rather draw from the bucket containing 10 winning tickets out of 100 than from the bucket containing 1 winning ticket out of 10, even though they realize that the odds are the same for both buckets (Kirkpatrick & Epstein, 1992; Miller et al., 1989). This differential response rate has led to the conclusion that mathematically equivalent ratios can be psychologically different, and has been called “psychological

uncertainty” (Kirkpatrick & Epstein, 1992; Miller et al., 1989; Windschitl & Wells, 1996).

Kirkpatrick & Epstein (1992), using the lottery task described above, found that both the ratio of winners (either 10% or 90%), and whether the task was framed as drawing a winning or losing ticket, influenced the decision. When participants could win or lose real money, participants preferred to draw from the bowl with more tickets when 10% were winners (i.e., preferred 10/100 to 1/10), and from the bowl with fewer tickets when 90% were winners (i.e., preferred 9/10 to 90/100). When framed in terms of a losing ticket, participants preferred to draw from the bowl with more tickets when 90% were losers, and to draw from the bowl with fewer tickets when 10% were losers. Thus, the framing of the information reversed the preference pattern. This finding is consistent with previous research on the framing of information in which most people are risk averse when information is framed in terms of gains, but are more likely to select a risky option when information is framed in terms of losses (Kuehberger, 1998; Levin, Schneider, & Gaeth, 1998)

One explanation provided for framing effects revolves around the ability to imagine alternative outcomes (Kirkpatrick & Epstein, 1992; Miller et al., 1989). After learning of an outcome, participants imagine the ways a similar outcome (or opposite outcome depending on which is made salient) might have occurred. The ease with which alternatives can be imagined determines the normality of an event, with abnormal events evoking more surprise, distress, and suspicion than normal ones (Miller et al., 1989).

One might suggest that framing effects only occur when the task is not meaningful to participants, and thus, they do not actively examine the issue (Lauver & Rubin, 1990; Llewellyn-Thomas, McGreal, & Thiel, 1995; Siminoff & Fetting, 1989; Wilson, Wallston, & King, 1990). As such, framing presumably would not play a significant role in patients' decisions regarding their own health, assuming their health is meaningful to them. A number of studies, though, have found that the framing of options does influence hypothetical medical decisions. These decisions include choosing to undergo surgery (Rybash & Roodin, 1989; Wilson, Kaplan, & Schneiderman, 1987), choosing to abort a child affected with haemophilia (Wilson et al., 1987), choosing whether to become pregnant based on the probability of the child having a serious heart abnormality (McNeil, Pauker, & Tversky, 1988), and choosing between drug treatments (Kuhn, 1997). Thus, it appears that how information is presented to the patient can have a substantial impact on the decision made.

In an informed consent case jurors are presented with the outcome (some injury to the patient) and are expected to determine if the occurrence of the injury was foreseeable, thereby requiring the risk of that injury to have been disclosed. If the health care provider had not disclosed that information, his/her defense will most likely be based on why it was not disclosed. Consequently, the absolute numbers used by the physician in describing the probability (in frequency terms) of the injury occurring may cause mock jurors to view mathematically equivalent probabilities as more or less likely to occur, which in turn, could affect judgments of liability.

Experiment 3 examines how psychological uncertainty (PU) affects mock juror decisions by manipulating the magnitude of the numbers composing the frequency used to describe the risk of an injury occurring. It is expected that high psychological uncertainty will result in decisions more favorable to the plaintiff, while low psychological uncertainty will result in decisions more favorable to the defendant. Experiment 3 also examines if framing the frequencies in terms of the likelihood of an injury occurring versus the likelihood of an injury not occurring influences mock juror decisions. The same case summary is used as in Experiments 1 and 2.

Hypotheses

Kirkpatrick and Epstein (1992) showed that when a lottery choice involves a negative outcome (e.g., drawing a losing ticket), participants prefer the option with fewer similar alternatives (e.g., 1/10 are losers preferred over 10/100 are losers). If the risk of paresthesia occurring is viewed as similar to a negative lottery choice, then patients would prefer to take the risk when fewer similar alternatives are available (e.g., 1/370 as compared to 100/37,000). Thus, since mock jurors are supposed to decide what the patient would have done had the risk of paresthesia been disclosed, they should find in the plaintiff's favor more often when psychological uncertainty is high rather than low (because when psychological uncertainty is high a reasonable person would be more likely to refuse treatment). Consequently, participants will be more biased against the defendant, resulting in Hypothesis 1:

Hypothesis 3.1 Mock jurors will find the defendant liable more often, award more in damages, assign the defendant more liability, and have more favorable ratings of the plaintiff (and less favorable ratings of the defendant) in the high PU condition than in the low PU condition.

Based on previous research in which changing how the information is framed reverses participants' preferences (Kirkpatrick & Epstein, 1992) Hypothesis 2 states:

Hypothesis 3.2 Framing and psychological uncertainty will interact such that participants will be more favorable to the plaintiff in the negative frame and more favorable to the defendant in the positive condition.

Method

Participants. Participants were 112 undergraduate students enrolled in introductory psychology classes at a large southeastern university who received extra credit for their participation. Sixty-four percent were women and 83% were white. The mean age was 19.17 years (SD = 2.29, Mdn = 19).

Materials & Design. Experiment 3 is a 2 (framing) x 2 (psychological uncertainty) between subjects design. Framing is manipulated by indicating the number of surgeries in which the injury does (negative) or does not (positive) occur. That is, the physician states either that 1 in 370 surgeries result in paresthesia or 369 in 370 surgeries do not result in paresthesia. Note that paresthesia is used as the injury to avoid any ceiling effects as may be encountered by a more severe injury.

The two levels of psychological uncertainty (PU) are 1 in 370 (low), and 100 in 37,000 (high). These were chosen to represent the verbal equivalent of the word "rare" as determined by Merz et al. (1991). The same case summary is used as in Experiments

1 and 2, with the above changes to the probability of the risk occurring in the physician's explanation of the non-disclosure.

Procedure & Dependent Variables. The same procedure and dependent variables are used as in Experiments 1 and 2.

Results

As in Experiments 1 and 2, the liability judgments were subjected to a logistic regression (frame and psychological uncertainty entered as categorical predictor variables), and the damage awards were collapsed across conditions in order to carry out planned comparisons (due to the low number of liable verdicts: 38% across conditions¹⁸) concerning the hypotheses on the natural log of the damage awards (independent t-tests for both factors). All other dependent variables were subjected to 2x2 between subjects ANOVAs.

Hypothesis 3.1 states that mock jurors will find the defendant liable more often, award more in damages, assign the defendant more liability, and have more favorable ratings of the plaintiff in the high PU condition than in the low PU condition. An independent samples t-test found that participants did indeed award more in damages when psychological uncertainty was high ($M = 11.85$, $SD = 2.15$, $n = 23$) than when it was low ($M = 10.47$, $SD = 2.40$, $n = 16$), $t(37) = 1.87$, $p < .05$, $\eta^2 = .103$.¹⁹ However, contrary to expectations, psychological uncertainty did not have a significant effect on

¹⁸This is slightly higher than that found in Experiment 2 (28%) and the paresthesia injury condition of Experiment 1 (33%).

¹⁹Raw damage award values are: High PU ($M = \$1,133,913$; $SD = \$2,819,576$; $Mdn = \$100,000$) and Low PU ($M = \$442,188$; $SD = \$1,243,369$; $Mdn = \$30,000$).

any of the other variables (liability decisions: $\beta = .18$, $p = .74$; defendant culpability: $F(1,103) = 0.77$, $p = .38$; overall rating of the plaintiff: $F(1,108) = 1.99$, $p = .16$; plaintiff informedness: $F(1,106) = 0.004$, $p = .95$).

Hypothesis 3.2 states that framing and psychological uncertainty will interact. A significant cross-over interaction was found for plaintiff informedness, $F(1,106) = 4.21$, $p < .05$, $\eta^2 = .038$ (see Table 4 for means and standard deviations). This interaction indicates that when psychological uncertainty is low, participants rate the plaintiff as significantly more informed in the negative frame than in the positive frame, $t(52) = 1.63$, $p < .05$. Conversely, when psychological uncertainty is high, participants rate the plaintiff as more informed in the positive frame than in the negative frame, although this difference does not reach significance, $t(54) = 1.26$, $p = .11$.

Table 4. Means (standard deviations) and sample size for plaintiff informedness.

Frame	Psychological Uncertainty	
	Low	High
Positive	4.67	5.14
	(1.41)	(1.24)
	$n = 27$	$n = 28$
Negative	5.22	4.71
	(1.05)	(1.30)
	$n = 27$	$n = 28$

This interaction was not significant for any of the other dependent variables (liability decisions: $\beta = .36$, $p = .66$; damage awards: $F(1,35) = 0.06$, $p = .81$;²⁰ defendant

²⁰Since cell sizes ranged from 5-12, so any conclusions must be tempered.

culpability: $F(1,103) = 0.06$, $p = .81$; and overall rating of the plaintiff: $F(1,108) = 0.99$, $p = .32$).

Framing Effects. A main effect of framing was found for the defendant culpability ratings, $F(1,103) = 3.84$, $p < .05$, $\eta^2 = .036$, such that the defendant was rated as more culpable in the positive frame condition ($M = 58.81$, $SD = 27.50$, $n = 57$) than in the negative frame condition ($M = 49.30$, $SD = 22.68$, $n = 50$). This main effect was not significant for the liability decision ($\beta = .12$, $p = .83$), damage award ($t(37) = .74$, $p = .23$), overall rating of the plaintiff ($F(1,108) = .002$, $p = .97$), or ratings of plaintiff informedness: $F(1,106) = 0.07$, $p = .79$).

Components of Liability. The two questions concerning the conditions necessary for finding the defendant liable were subjected to 2x2 between subjects ANOVAs.²¹ As with the culpability ratings, there was a main effect of framing, $F(1,106) = 6.72$, $p < .05$, $\eta^2 = .060$, for agreement with the statement that “A reasonable person would require to be informed about the potential risk of paresthesia in order to make an informed decision about whether or not to undergo the surgery.” Participants agreed with the statement more when the risk information was framed negatively ($M = 5.40$, $SD = 1.51$), than when framed positively ($M = 4.58$, $SD = 1.75$). Neither the main effect for psychological uncertainty nor the interaction was significant for this question, F 's < 1 , p 's $> .39$.

²¹As in Experiments 1 and 2, the correlation between the two components was low, $r = .29$, suggesting that participants were not treating the two questions as the same, thereby allowing for each question to be analyzed separately.

There were no significant main effects or interactions, $F's < 1$, $p's > .38$, concerning agreement with the statement “Had Mrs. Emerson known of the risk of paresthesia she would not have decided to undergo the surgery.” Thus, it appears that message framing influenced ratings of what a person would want to know, but would not have influenced the decision to undergo the surgery.

Supplementary Analyses. The same supplementary analyses as in Experiments 1 and 2 were conducted, replicating the results previously found. Participants voting liable had a higher overall impression of the plaintiff, $t(102) = 6.27$, $p < .05$ (liable: $M = 4.41$, $SD = 0.82$; not liable: $M = 3.22$, $SD = 1.01$), while those who voted not liable had a higher overall impression of the defendant, $t(101) = 3.93$, $p < .05$ (not liable: $M = 4.63$, $SD = 0.98$; liable: $M = 3.79$, $SD = 1.13$).

Discussion

Mixed support was found for the hypotheses of Experiment 3. As expected, participants awarded more in damages when psychological uncertainty was high than when it was low. However, psychological uncertainty did not significantly affect any of the other dependent variables. One reason for not obtaining an effect for any of these other variables may have to do with the task. Previous research on psychological uncertainty has presented participants with two options of the same probability to choose from. That is, participants typically see both levels of psychological uncertainty. In the current study, participants were exposed to only one level of psychological uncertainty. It could be that without having a second option to choose from, one does not focus on the properties of the numbers making up the frequency resulting in the typical findings.

Future studies on psychological uncertainty in a medical situation may want to present the information in two ways, such as a second opinion from another physician, and then have the patient decide which physician they would prefer to perform the procedure.

Partial support was also found for the expected interaction between framing and psychological uncertainty. A significant cross-over interaction was found for ratings of how informed the plaintiff was, but not for any other dependent variable.

Another main finding was that participants rated the defendant as being more culpable when the risk information was framed as occurring, than when it was framed as not occurring. However, participants also had higher ratings of agreement that a reasonable person would want to be informed about the risk of paresthesia when the information was framed as not occurring than when framed as occurring. This pattern seems to contradict itself, as one would expect that the defendant would be held more responsible when participants were more likely to feel that the information should be disclosed.

Finally, as in Experiments 1 and 2, the supplementary analyses were replicated, again showing that participants voting liable had a higher overall impression of the plaintiff, while those voting not liable had a higher overall impression of the defendant.

Experiment 4: Treatment Choice

The three previous Experiments have addressed how jurors make decisions partly based on whether or not the plaintiff would have made the same choice had she been provided the non-disclosed information. However, jurors in this task, already know of the negative outcome (surgery resulted in an injury). Having this knowledge of the negative outcome may cause jurors to assign too much weight to the information concerning the non-disclosed risk. This is known as the hindsight bias, and has been shown to influence many types of decisions (Casper & Benedict, 1993; Christensen-Szalanski & Willham, 1991; Fischhoff, 1975; Hawkins & Hastie, 1990; Thompson, Fong, & Rosenhan, 1981; Zickafoose & Bornstein, 1999).

Because the effect size of the hindsight bias has been shown to be larger the less familiar one is with the task, the trial situation may be especially susceptible to the hindsight bias due to the difficulty and unfamiliarity of the tasks that jurors are expected to perform (i.e., determining liability and awarding damages) (Christensen-Szalanski & Willham, 1991; Hawkins & Hastie, 1990). For example, Casper and Benedict (1993) manipulated outcome information in a search and seizure trial. Participants were told that, in the search, police either found or did not find heroin. Participants awarded more in damages when no heroin was found as opposed to when heroin was found. Furthermore, Zickafoose and Bornstein (1999) found that mock jurors, in a medical malpractice case, are unable to ignore the amount of negligence contributed by the plaintiff resulting in “double discounting” of the damage award. Thus, knowing the outcomes can influence mock juror decisions.

Since hindsight has been shown to influence mock juror decisions, it would be important to know if participants in the previous three Experiments would make the same decisions without knowledge of the negative outcome. Experiment 4 addresses this problem, by replicating Experiment 3 using a slightly different task.

Instead of determining liability in a trial, participants in Experiment 4 are given a summary containing the same information concerning the initial complaint and the physician's recommendation and discussion of the risks involved as used in the previous Experiments. This summary though, stops at the point of the patient deciding whether or not to undergo the surgery. At this point, the participant is informed of the potential risk of paresthesia associated with the surgery (the patient is not told of this information). The participant is then asked to indicate whether or not the patient should undergo the surgery (using a 7-point scale anchored by definitely should undergo the surgery, and definitely should not). No information concerning the outcome of the surgery is provided in the summary.

Hypotheses

Participants are supposed to decide what the patient should do had the risk of paresthesia been disclosed. This is similar to the agreement ratings of whether the plaintiff would not have undergone the surgery had she been informed of the risk of paresthesia in Experiments 1-3. Consequently, the same hypotheses from Experiment 3 are used for Experiment 4.

Hypothesis 4.1 Participants will indicate that the patient should still undergo the surgery more when PU is low than when PU is high.

Based on previous research in which changing how the information is framed reverses participants' preferences (Kirkpatrick & Epstein, 1992) Hypothesis 2 states:

Hypothesis 4.2 Framing and psychological uncertainty will interact such that participants will indicate that the patient should undergo the surgery in the negative frame but should not undergo the surgery in the positive frame.

Method

Participants. Participants were 74 undergraduate students enrolled in introductory psychology classes at a large southeastern university who received extra credit for their participation.

Materials & Design. Experiment 4 is a 2 (framing) x 2 (psychological uncertainty) between subjects design. The same basic facts used in the case summary in Experiments 1-3 are used for Experiment 4. This includes, the initial complaint leading to the patient going to her physician, the recommendation of the physician to see a specialist, the specialist's recommendation to undergo treatment, and the amount of time spent by the physician going over the procedure. The scenario also states that the patient is not informed of the risk of paresthesia. The main difference between the previous studies and Experiment 4 is that instead of participants determining liability in a malpractice lawsuit, participants were asked to indicate whether the patient should undergo treatment had she been given the information about the risk of paresthesia. Nowhere in the scenario is there an indication of the outcome of the surgery, thereby reducing the impact of hindsight on the decision. However, hindsight may still play a

role since participants are given information the patient is not (the probability of paresthesia occurring).

Dependent Variable and Procedure. Participants read the one page scenario and then answered the following question on a seven-point scale, anchored by “definitely should” and “definitely should not”: “Given the risk of paresthesia, please indicate below whether you believe that Mrs. Emerson should undergo the surgery to alleviate the numbness in her arm that led her to see her doctor in the first place.” The entire procedure took approximately 5-10 minutes.

Results and Discussion

Experiment 4 was an attempt to see if decisions made without the negative outcome information would be affected by psychological uncertainty and framing. To test this, the agreement ratings were subjected to a 2(framing) x 2(psychological uncertainty) between subjects ANOVA. It was found that participants felt that the patient should still undergo the surgery significantly more when the risk information was framed in terms of the injury not occurring ($M = 5.57$, $SD = 1.19$) than when framed as the injury occurring ($M = 4.78$, $SD = 1.65$), $F(1,70) = 5.50$, $p < .05$. Neither the main effect for psychological uncertainty nor the interaction was significant ($F(1,70) = 1.39$, $p = .24$; $F(1,70) = 0.22$, $p = .64$ respectively).

The question asked in Experiment 4 is akin to that in Experiment 3 asking for agreement to the statement “Had Mrs. Emerson known of the risk of paresthesia, she would NOT HAVE decided to undergo the surgery.” While framing did not reach significance on this question in Experiment 3, the trend was the same as found in

Experiment 4. As in Experiment 3, psychological uncertainty did not significantly effect the ratings of whether or not the patient should still undergo the surgery.

The fact that framing had an effect in Experiment 4, while not having an effect in Experiment 3, lends credence to the theory that hindsight played a role in the lack of results in Experiment 3. Typical findings of hindsight studies indicate that participants are unable to ignore outcome information resulting in different decisions than when not presented the outcome information (Hawkins & Hastie, 1990). Hindsight is a very robust phenomenon (Hawkins & Hastie, 1990) and has been found to occur both when making judgments for yourself and when evaluating decisions of other people (Baron & Hershey, 1988; Mitchell & Kalb, 1981). For example, Baron and Hershey (1988), examining medical treatment decisions and monetary gambles, found that outcome information influenced evaluations of the quality of the decision, the competence of the decision maker, and the willingness of the subject to let the decision maker make decisions for them. Mitchell and Kalb (1981) also showed that hindsight can be applied to other peoples' decisions by exploring how outcome information influenced supervisor performance ratings. They found that the outcome of the decision was more important in the supervisors' ratings than the actual decision made. So, once again, knowing the outcome of some series of events influences how people perceive those events.

In the current Experiments, when participants do not know of the negative outcome resulting from the surgery (Exp. 4), they are more likely to believe that the patient should undergo the surgery when it is framed in a manner that appears to limit the possibility of that injury occurring. However, if the outcome information is known

(Exp.3), then participants are no more likely to recommend undergoing the surgery according to the framing of the risk. Thus, knowing the outcome information, resulted in different recommendations. However, since Experiment 4 did not directly manipulate hindsight, future studies that directly test this conclusion are necessary.

General Discussion

The current experiments were designed with two main goals in mind. First, they were designed to ascertain how the conveyance of risk information affects juror decisions, thereby providing suggestions on how to present arguments concerning probabilities in the most effective manner. The second goal was to replicate and extend the literature on how people understand and utilize probabilistic information. A medical malpractice case involving a claim of a lack of informed consent was chosen for this purpose because it addresses both goals. It involves a legal claim which health care providers face, some say at a growing pace (Annas, 1976; Curran, 1970; Hirsh & Wilcox, 1992; Slovenko, 1997), and it makes the probability of a non-disclosed risk occurring very salient. That is, the point of contention is why the patient was not informed of the possibility of the complication occurring. Thus, how the probability of that risk occurring is presented would conceivably play a large role.

In regard to the first goal, Experiments 1 and 2 found that mock jurors' liability, culpability, and damage award decisions were all not significantly affected by the format of the probability expression. The results of Experiment 1 indicate that whether the probability of the complication occurring was described with a verbal estimate, quantitative estimate, or a combination of both did not matter. Experiment 2 extended this by finding no differences between probabilities expressed as percentages or frequencies. The results of the first two Experiments also indicate that the base rate of the complication arising does not play a role in mock juror liability and damage award decisions. However, it could be that the base rate manipulation was not sufficiently

salient and was thus ignored by the participants, while they focused on other aspects of the summary. Even if the manipulation was salient enough, it could be that the base rates used were all sufficiently low that they fell below some threshold for action (Camerer & Kunreuther, 1989). If that is the case, then participants could have been aware of the base rate, but treated all of the conditions as essentially the same. This possibility is bolstered by the finding of a three-way interaction for culpability in Experiment 1. In examining this interaction, it was found that the severity of the injury only had an effect (i.e., more severe injury resulting in higher culpability ratings) in the high base rate condition when a quantitative expression of probability was used (either alone or in conjunction with a verbal expression). This would suggest that the high base rate condition may have been above the threshold, while the other two conditions were not. However, since a manipulation check for comprehension of the base rate manipulation was not included, strong conclusions about the (non)effects of base rate on mock juror decisions are not warranted.

The results of Experiment 3 indicated that how frequency information is framed affected culpability ratings. Mock jurors rated the defendant as being more culpable (responsible) when the risks were framed as “The injury occurs in 1 out of 370 procedures” than when framed as “The injury does not occur in 369 out of 370 procedures.” Thus, it would appear that if physicians are confronted with a lack of informed consent case, their safest strategy for being judged least responsible would be to focus the description on how often the injury does not occur. However, this was only examined with frequency information. Further research needs to be conducted to

determine if this relationship holds for information presented as probabilities and percentages as well.

Experiment 3 also found that mock jurors awarded more in damages when the psychological uncertainty was high as compared to when it was low. This would suggest that when using frequency information, the interests of the defendant are best served by reducing the ratio of the frequency so that the numerator reflects smaller absolute numbers. Conversely, plaintiffs would be best served to adjust the ratio so that the numerator contains larger absolute numbers. However, since this is the first experiment to examine how psychological uncertainty affects damage awards, much more research is needed to explore the boundaries of this phenomenon before any strong recommendations can be made.

Taken as a whole, the results of Experiments 1-3 indicate that the probability expression used to describe the likelihood of a complication occurring during a medical procedure has little impact on the mock jurors' liability ratings and damage awards. Given the null results within each experiment, and the fact that there was little variation across all three experiments in either culpability ratings (values ranged from 47%-58%) or liability decisions (26%-42%), there is little basis for recommending the use of any one type of probability expression over another. As such, it would be beneficial to compare the current results to those of previous researchers, in order to provide recommendations.

Siegrist (1997) suggests using frequency information when one wants to emphasize the threat of a risk and to use probabilistic expressions to downplay

differences between risk levels. Accordingly, in a trial situation where the defendant is trying to downplay the likelihood of a risk occurring, he/she would be better off by not using frequency information. On the other hand, if a health care provider wants a patient to understand a risk, or some other type of probabilistic information, then, according to Siegrist, presenting that information as a frequency may be more effective. Experiment 4, which examined how participants believed a patient would act based on some probabilistic information, found that how the information was framed influenced whether or not participants would recommend undergoing treatment. However, Experiment 4 did not directly compare frequency and percentage expressions, and thus did not provide a meaningful evaluation of Siegrist's claims.

Experiments 1-3, however, did directly address the claims by Siegrist (1997). Not only did Experiments 1-3 fail to find evidence supporting Siegrist's suggestion, but an examination of the damage awards provides evidence against it. While null results were the typical finding concerning mean damage awards (with the exception of a main effect due to psychological uncertainty in Experiment 3), the small sample size and large negative skew of the data suggest that the median amounts may be more informative than the mean awards. In examining the median awards across all three experiments, a pattern emerges (see Table 5 for the median damage award for each expression of probability across Experiments 1-3).

Beginning with Experiment 1, it can be seen that higher median damages were awarded when a verbal expression of probability was used (either alone or in conjunction with a quantitative value) than when a quantitative expression was used. Experiment 2

then explored two different types of quantitative expression and found that frequency expressions resulted in lower median awards than percentage expressions. Finally, Experiment 3 examined two different types of frequency expressions and found that having low psychological uncertainty resulted in lower median awards than high psychological uncertainty. Thus, the lowest median award was for a frequency expression, while the highest median award was for a verbal expression. This pattern, coupled with the null results in liability and culpability ratings, suggests that physician-defendants who wish to maximize their defense (i.e., decrease the likelihood of being found liable, but if they are, then decrease the damage award) should express probability information in terms of frequencies with low psychological uncertainty. This contradicts the suggestion by Siegrist (1997).

Table 5. Median damage award amounts for probability expressions across experiments.

Probability Expression	Median Damage Award in Dollars
Experiment 1	
Verbal	250,000
Quantitative	100,000
Verbal & Quantitative	250,000
Experiment 2	
Percent	100,000
Frequency	50,000
Experiment 3	
High Psychological Uncertainty	100,000
Low Psychological Uncertainty	30,000

The second goal of the current experiments was to replicate and extend the previous research concerning the interpretation and use of probabilistic information and

juror decision making. On this account, there was limited success. Experiment 1 was able to replicate previous research indicating that the severity of the injury influences both liability decisions (Bornstein, 1998; Feigenson et al., 1997) and damage awards (Bovbjerg et al., 1991; Feigenson et al., 1997; Rodgers, 1991; Vidmar, 1995). However, the current experiments failed to replicate previous research showing that the type of probability expression used influences participants' decisions (Cosmides & Tooby, 1996; Gigerenzer & Hoffrage, 1995; Siegrist, 1997; Slovic et al., 2000; Tversky & Koehler, 1994; Teigen & Brun, 1999; Windschitl & Wells, 1995). While this was the first attempt to extend these findings to a civil trial, the similarities between the task used here and in previous research (e.g., the criminal trial used by Thompson & Schumann, 1987, and Siegrist's (1997) examination of decisions based on the probability of a complication arising from a medical treatment) is enough to suggest that similar findings should result. However, it might not be just a civil trial, but the fact that it was a medical malpractice trial. As mentioned earlier, malpractice trials tend to be treated differently from other types of trials. Nearly all malpractice claims (93%) are settled out of court (or discontinued or dismissed) before trial. Of the 7% making it to trial, 50% of those are settled during trial. Of the 3% that make it to a verdict, 80% result in verdicts in favor of the defendant (Mackauf, 1999; Taragin et al., 1992).

Another difference between the medical malpractice case used here and Thompson and Schumann's (1987) criminal trial revolves around the fact at issue. In Thompson and Schumann's study, the fact in dispute (as in most criminal trials) was "did the defendant do it." Thus, the probability evidence was presented to answer the

question, “Did the hair sample match the defendant?” In the current studies, whether or not the defendant “did it” is not in dispute – the risk information admittedly was not disclosed. As such, the question being addressed by the evidence is “should it have been disclosed.” Since the jury is being asked to answer different questions in the two types of trials, it might be that probabilistic information may be treated differently. For example, when supplied to answer the “did he do it” question, it may be viewed as the most relevant information. However, if the probability evidence is being introduced to answer the “should it have been disclosed” question, it may be only one of many considerations. However, it is not clear what those other considerations may be.

A second finding in conjunction with the second goal was that across all of the experiments in which participants rendered a liability decision, those who determined the defendant was liable had a better overall impression of the plaintiff, while those who determined the defendant was not liable had a better overall impression of the defendant. This is consistent with the idea that jurors base their liability decisions, at least in part, on how much they like the defendant (Mackauf, 1999). Mackauf (1999) claimed that jurors are willing to forgive almost any malpractice if they like the health care provider (i.e., find him/her to be caring, competent, and compassionate) but will find against the health care provider if they dislike him/her (i.e., find him/her arrogant, lazy, or incompetent), even if no malpractice has occurred. While the current findings are not a direct test of these claims, they are at least consistent with the idea that personal feelings toward the health care provider are related to liability decisions.

Limitations and Future Directions

The current studies were the first attempt to extend how people comprehend and use probabilistic information to a civil lawsuit concerning medical malpractice. In doing so, a number of characteristics of a real trial were altered to give the best chance of replicating previous findings. For instance, while the malpractice case used was based on an actual case in which the plaintiff won, the current studies used a two-page summary of the trial. Although the summary included the facts surrounding the case, it may not have had the same effect on jurors as an actual trial.

Two different studies have found that the mode of presentation affects dichotomous guilt verdicts in criminal trials (Bermant, McGuire, McKinley, & Salo, 1974; Juhnke et al., 1979). The conclusion from these studies is that researchers should design their studies more closely to what actually happens in the courtroom. An interesting finding in the Bermant et al. (1974) study is that as the mode of presentation became more realistic, more participants voted not guilty. However, the actual case on which they based the study resulted in a verdict of manslaughter. As such, maybe their call for greater verisimilitude in research is not necessary. In addition, Juhnke et al. (1979) found the opposite result.

Wissler et al. (1997) suggest that short summaries may be more appropriate when studying damage awards, since the majority of the trial concerns the issue of liability. Furthermore, Wissler et al. (1997) report two unpublished studies (Hart, Wissler, & Saks, 1994; Diamond, Dimetropoulos, Landsman, & Saks, 1995) that compared non-economic damage awards for 6-sentence scenarios, 14-sentence

scenarios, and a three-hour videotaped mock trial. These studies showed that the length of the written case scenarios had no effect on the pain and suffering awards and that the mean awards for the written scenarios were within a quarter of a standard deviation of the awards from the videotaped trial. Kramer and Kerr (1989), in examining the biasing effect of pretrial publicity, also failed to find an effect due to trial length. Bornstein (1999), in a review of the jury simulation literature, found eleven studies that directly compared the trial medium. Of those eleven studies, only three found the presentation medium to have a main effect on mock jurors' verdicts. Furthermore, the results of those three studies were conflicting (i.e., the Bermant et al., 1974 and Juhnke et al., 1979 studies described above). Thus, it appears that using a trial summary would not necessarily invalidate the current findings. However, Diamond (1997) has argued that because some differences have been found due to how realistic a trial is, in the interest of ecological validity, future studies should involve a full trial (videotaped if possible).

A second limitation is that participants did not deliberate. However, studying individual decisions allows for examination of the underlying processes that serve as the basis for the group's decision (Wissler et al., 1997), or, stated another way, the focus was on individual judgment processes. Even so, it has been shown that during deliberations damage awards may become a bartering tool that allows a compromise between the majority view and the minority view (Guinther, 1988). Thus, future studies should also include deliberations.

A final limitation is that a specific type of case (medical malpractice) involving a specific type of claim (lack of informed consent) was used for the current experiments.

It has already been mentioned that malpractice cases are treated differently from other types of civil suits (Moller, 1996; Taragin et al., 1992). Vidmar et al. (1994) suggested some reasons for the differences between medical malpractice lawsuits and auto accidents: (1) Malpractice cases usually involve more than one defendant (auto accident cases usually just have one); (2) multiple theories of liability are more common in malpractice cases; (3) the primary dispute in malpractice cases is liability, while the primary dispute in auto accident cases typically hinges on damages; (4) the fact patterns leading to the injury are different; (5) in malpractice cases the injured plaintiff is usually a passive participant in the events, while in auto accident cases, it may be possible to assign some of the responsibility to the plaintiff; and finally (6) there is a professional and fiduciary relationship between the plaintiff and the physician. This last suggestion may explain why no differences were found between types of probability expressions. It could be that mock jurors take into account this professional and fiduciary relationship when making their decisions. That is, they start with the assumption that health care providers are motivated by helping people, and as such, are loath to find against a health care provider absent obvious direct evidence to the contrary. If this is the case, then extending the current studies to other types of civil suits could provide a better opportunity for replicating previous research showing that people respond differently to various probability expressions.

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Appendix A

Mapping of Verbal Expressions of Probability

Verbal Expression	Quantitative Equivalent
Very High	.6310
Great Likelihood	.2818
Rather High	.1585
Quite Common	.0100
Frequent	.1585
Common	.1000
Possible	.0316
Uncommon	.0631
Unusual	.0050
Infrequent	.00001
Occasional	.0016
Low	.0631
Negligible	.0025
Not High	.0100
Small	.0010
Minimal	.0063
Quite Unusual	.0027
Quite Small	.0027
Rare	.0027
Remote	.0003
Very Slight	.0158
Very Low	.0010
Very Unlikely	.0158
Very Small	.0027
Very Rare	.0027
Very Remote	.00001
Extremely Low	.0040
Extremely Unlikely	.0316
Extremely Small	.0040
Extremely Rare	.0006
Extremely Remote	.0001
Very Very Minimal	.0040

Note. Because the quantitative equivalents were based on anywhere from 1-10 observations, the verbal expressions are ordered in terms of what the rankings of typical mapping studies find. Bolded values are those used for Experiment 1.

Appendix B

Case Summary

Plaintiff: Jessie M. Emerson

Defendant: Dr. Gerald Bell and Valley Forge General Hospital

Case Description: Medical Malpractice due to Lack of Informed Consent.

Facts:

Mrs. Emerson, age 50, went to her family physician (Dr. Brian Emler) on January 24, 1992, after complaining of numbness and tingling in the left arm. Dr. Emler recommended that she see a specialist, Dr. Gerald Bell. On February 5, 1992, she went to see Dr. Bell, a neurosurgeon, who conducted a number of tests. One of the tests, an MRI, discovered a tumor in the spinal column. Acting on the recommendation of Dr. Bell, Mrs. Emerson underwent surgery on February 19, 1992 to remove the tumor. During the removal of the small tumor, the spinal cord was injured resulting in the entire left side of Mrs. Emerson's body becoming permanently numb and tingling, a condition known as paresthesia. At issue is whether Dr. Bell provided enough information to Mrs. Emerson to make her aware that the surgery could result in this condition. The actual consent form is included as Exhibit A.

Plaintiff's Case:

Mrs. Emerson claims that the surgery took place without the legally mandated informed consent because it was never fully explained to her that the entire left side of her body could become permanently numb and tingling as a result from the surgery. She states that Dr. Bell spoke to her extensively about how the surgery would be performed,

but did not discuss the risk of paresthesia. To support her claim Mrs. Emerson's attorney produced the consent form (Exhibit A) that Mrs. Emerson signed in which neither paresthesia nor numbness is listed as a risk factor. Mrs. Emerson claimed that had she known of the possibility of the entire left side of her body becoming numb she would have not undergone the surgery.

Defendant's Case:

Dr. Bell claims to have spent about 15-20 minutes with Mrs. Emerson going over the standard informed consent used by the hospital. During this time he covered what the procedure would involve (what and how it would be done) and addressed her concerns about the procedure. He states that he explained in plain English what each of the risks listed on the second page of the consent form meant and provided an estimate of the likelihood of these risks occurring. Dr. Bell admits that paresthesia is not listed as a potential risk, but claims that since research shows this injury occurs in only 3 out of 10,000 cases it does not warrant disclosure. Furthermore, Dr. Bell claims there has to be a cut-off in which a risk need not be explained due to the low likelihood of its occurrence, otherwise the potential risks for any procedure could reach into the hundreds, and it would take too long and confuse the patient to cover them all. Dr. Bell also claims that Mrs. Emerson was provided with an opportunity to ask any questions concerning the procedure and that she signed the form stating that all of her questions had been answered to her satisfaction.

Informed Consent Law:

The case you just read is only concerned with whether or not an informed consent was achieved. It does **NOT** involve whether Dr. Bell was negligent in the performance of the surgery. That matter has already been resolved. You are only to consider the issue of informed consent.

The doctrine of informed consent requires that a patient be provided with any and all information that a reasonable person would require, in a manner that he/she can understand, in order to make an informed decision as whether to undergo a specific treatment. This includes a description of the procedure, the potential benefits, the potential risks, and the availability of alternative procedures. Informed consent is not merely the signing of a form giving permission to proceed, but it is a process in which both the patient and the health care provider exchange information allowing the patient to reach an informed decision concerning his/her treatment. Indeed, signed forms are not legally necessary.

In order to find the defendant liable for malpractice for a lack of informed consent, you must determine that Dr. Bell did not disclose the risk of paresthesia to Mrs. Emerson and that if he had, that Mrs. Emerson would not have undergone the surgery. The legal standard for coming to this conclusion is by a preponderance of the evidence. This means that the evidence shows that the defendant is more likely than not to have committed malpractice.

Request for Compensation:

If you determine that Dr. Bell was negligent by not disclosing the risk of paresthesia, Mrs. Emerson is allowed compensation for her injuries: numbness and tingling of the entire left side of her body. As a result of the injuries suffered by Mrs. Emerson, she is also no longer able to knit and finds it extremely difficult to cook for herself, both activities she enjoyed prior to the surgery. Also, physically active prior to her injuries, Mrs. Emerson is no longer able to go swimming, or do water aerobics, and the numbness has made walking difficult for her.

Vita

Douglas J. Zickafoose was born in Lima, Ohio, in 1972. He received his bachelor's degree in psychology with high honors from the University of Cincinnati in 1994, then a master's degree in psychology from the Louisiana State University in 1998. He is currently a doctoral student in cognitive psychology at Louisiana State University where he is also an instructor. His research interests focus on legal decision making, particularly, how jurors determine damage awards in civil law suits. He expects to receive the degree of Doctor of Philosophy at the Louisiana State University Commencement in May of 2001.

DOCTORAL EXAMINATION AND DISSERTATION REPORT

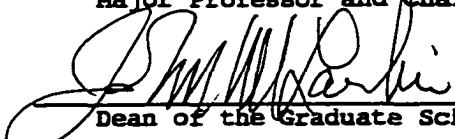
Candidate: Douglas J. Zickafoose

Major Field: Psychology

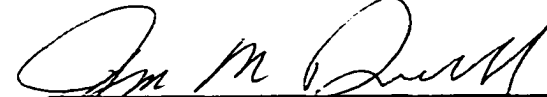
Title of Dissertation: It Rarely Occurs: Mock Juror Reactions To A Physician's
Defense In A Lack Of Informed Consent Case

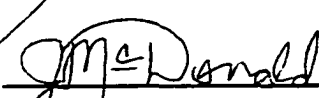
Approved:


Major Professor and Chairman



Dean of the Graduate School

EXAMINING COMMITTEE:









Date of Examination:

11/20/00
